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NEWS
IN
BRIEF

New Power Shortages Seen for 5 U.S. Areas

WASHINGTON, D.C. — DP users in five areas of the U.S. will be threatened by power shortages this summer, Federal Power Commission Chairman John Nassikas warned.

The regions endangered this summer are: New York, northern Illinois and Wisconsin, Iowa, Virginia and the Carolinas and Florida, he said.

Ten new nuclear and 35 new fossil steam units of 100 MW or larger, with a total capacity of 26,000 MW are necessary to provide adequate generating capacity through next summer, he said.

These plants would provide one third of the reserve capacity needed for a reliable electric power supply, but "most of these units are now threatened with delays for various reasons... In many instances where plants are physically delayed or subject to challenge, there are no available, acceptable alternative electric generating resources," Nassikas commented.

Rep. Gallagher Disclaims Tax Evasion, Other Charges

WASHINGTON, D.C. — Rep. Cornelius E. Gallagher (D-N.J.), indicted last week on federal charges of attempted income tax evasion, perjury and conspiracy, immediately declared the charges were politically motivated.

Gallagher, a strong advocate of personal privacy and critic of law enforcement surveillance activities, denied the charges and said they were intended to discredit him because of the activities.

The seven-term congressman said he had been under investigation ever since a *Life* magazine article in 1968 alleged that he had links with underworld figures.

On the Inside This Week

Shortcomings of T/S Systems
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DP Titles Standardized By New GSA Guidelines

By E. Drake Lundell Jr.

Of the CW Staff

WASHINGTON, D.C. — Federal officials here may have solved a problem that has plagued computer users for years by standardizing job descriptions for data processing personnel services.

Region 3 of the General Services Administration (GSA) issued the standards as part of a Basic Ordering Agreement

(BOA) which requires software firms to post standard prices for the various services.

10 Software Categories

Presently, the BOA defines 10 separate categories of software personnel, but it will probably be extended to other job categories and experience levels after a six-month trial period, according to T. Fred Nobel, chief of the federal ADP resources staff of the Automated Data Management Division in GSA's Region 3.

The definitions in their present state are "not perfect," Nobel said, and GSA is working with both industry and government users to develop better standards. Comments from other interested users are also welcome, he added.

The 10 categories and their definitions are:

- **Systems Management Engineer/Project Manager:** "He formulates statements of management, scientific and business problems by use of electronic data processing systems, and acts as project manager in the implementation. He must be an individual capable of meeting in conference with programs managers, and

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Cobol Compiler Up to 9 Times Faster in Test

By Don Leavitt

Of the CW Staff

TROY, N.Y. — Compilations run six to nine times faster with an ANS Cobol compiler from Computer Linguistics Inc. (CLI) than with the ANS Cobol compiler from IBM, according to a benchmark performed recently for a major leasing company in New York City.

Effectively, this meant that CPU costs dropped from \$57.11 with IBM's compiler to \$5.93 with CLI's, using the same source deck and hardware, CLI claimed.

Execution times are expected to be at least as good as with the IBM processor, but the object code generating segment of the CLI compiler is still under development, a company spokesman said.

Statements Flagged

CLI will support the highest level of ANS Cobol and most of the extensions provided by the IBM compiler. Following NBS Federal Cobol standards, statements utilizing the extensions will be flagged by the CLI compiler at the user's option.

The CLI processor, scheduled for delivery the third quarter of this year, will be available for IBM 360/370s operating under DOS, OS or TOS, and the RCA Spectra 70 CPUs operating under TDOS. Memory requirements may vary from 24K to 56K bytes, depending on user needs.

The compiler itself includes both reentrant and self-relocating code for maximum flexibility in multiprogramming situations. In addition, a "load-and-go" version, coupled with run-time diagnostics, will be particularly useful for rapid program development of small jobs, the spokesman suggested.

Cross Reference List

The documentation generated under user options includes a cross reference list of all variables and labels, a symbol table map, a list of the assembler language equivalents to the object code generated and a source statement listing with sequence checking.

The compiler will be modular in design so that users may limit the system to those features they expect to use. No price has been established yet, but the

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(CW Photo by F.J. Piasta)

H400 Retired

"George," a Honeywell H400 computer system, is presented with a watch at his retirement party by Tom Dillon, president of Batten, Barton, Durstine & Osborn of New York. George, however, refused the token, saying on his console printer, "Who cares what time it is when you work 24 hours a day seven days a week and have to wait 10 years for a kind word from management." An estimated \$1.4 million was saved by the agency during George's operation, according to public accountants.

Disk Oriented

Century 101 Upgrades 100

By Frank Piasta

Of the CW Staff

DAYTON, Ohio — NCR last week filled the gap between its Century 100 and 200 models by introducing the Century 101.

The new model offers twice the memory capacity of the Century 100 and can process a typical instruction mix two-and-one-half times as fast as the Century 100, and half as fast as the Century 200.

The Century 101 has higher disk capacities with the availability of the NCR 657 disk drive and it has the ability to handle up to 256 communications lines at about the same base price as the Century 100's.

The 101 CPU is a new design using core memory with a cycle time of 1.2 μ sec/2 bytes. The Century 100 has a

cycle time of 800 nsec/byte and the Century 200, 800 nsec/2 bytes. The memory is designed to be compatible with the LSI memories that will probably be used in future NCR computers, NCR said.

The instruction set is compatible with that of the basic Century 200 with 39 instructions, allowing the Century 101 with 64K memory to use both the level 3 Cobol and Fortran compilers. RPG and Neat/3 are available for smaller versions.

The basic memory capacity is 16K, expandable in 8K increments to 32K, and in 16K increments to 64K bytes.

A data bandwidth of 833 Kbyte/sec allows 7-way I/O simultaneity plus compute. A multiplexer trunk that can handle five devices at a data rate of 129 kbyte/

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Century 101 system with an NCR 657 disk drive

DP Titles Standardized by New GSA Guidelines

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other cognizant officials and to state problems in a form capable of being solved. He must be able to prepare plans, charts, tables and diagrams to assist in analyzing and displaying problems, working with a variety of scientific, business or engineering tables and formulas requiring a sound knowledge of mathematics.

"He evaluates proposed computer systems to determine technical feasibility, costs for implementation and operation as well as functional adequacy. He must have demonstrated capability for managing a team composed of analyst/programmers and specialists in implementing computer systems.

Such a person must have five years' experience as an analyst/programmer and a college degree or equivalent (with nine months' experience equaling a year of college), according to the definition.

• **System Analyst:** "He devises and prepares layouts for computer systems requirements and develops procedures to process data by means of ADP/EDP. He confers with other technical personnel to determine problems and type of data to be processed. He analyzes the problem in terms of equipment capability to determine techniques and formulates computer system requirements most feasible for processing data.

"He is adept in preparing a definition of the problems, together with recommendations for equipment needed for its solution, from which the programmer prepares flowchart and computer instructions. He writes specifications to the exact requirements for each program which will be written by the programmer within the system. The detailed written specifications for each program shall be supplied as a part of his function as an analyst, before any effort is applied to actually begin the program effort. He may be required to supervise the preparation and implementation of individual programs."

He must have a minimum of four years' experience as an analyst or programmer and a college degree or equivalent.

• **Senior Programmer:** "A senior computer programmer develops and prepares diagrammatic plans for solution of business, scientific and technical problems... He analyzes programs outlined by a systems analyst in terms of such factors as type and extent of information to be transferred from storage units, variety of times to be processed, extent of sorting and format of the final printed results. Additionally, he designs detailed programs, flowcharts and diagrams indi-

cating mathematical computations and sequence of machine operations necessary...

"The senior programmer also verifies accuracy and completeness of programs by preparing sample data and testing them by means of systems acceptance test runs made by operating personnel. He corrects program errors by revising instructions or altering sequence of operations. He is responsible for system documentation and operating runs procedures documented according to established... operations standards.

'Evaluates and Modifies'

"He evaluates and modifies existing programs to take into account changes in procedures or type of reports desired. He translates detailed flowcharts into coded machine instructions, confers with technical personnel in planning programs and works in programs within the system. He may be required to use concepts generally associated with third-generation equipment. Mathematical programming techniques may also be required."

This position calls for a minimum of three years' experience and a college degree or its equivalent (which is equal to three years' experience as a programmer.)

• **Programmer:** "A programmer is an individual who is capable, under general supervision, of analyzing and defining systems requirements and of developing programs for automatic data processing. This programmer conducts detailed analysis, studies all systems requirements and develops all levels of block diagrams and logic flowcharts. He must translate the details into a program of coded instructions used by a computer.

"He tests, checks, debugs, revises and refines the computer program as required to produce the product required by the written specifications. Additionally, the programmer documents all procedures used throughout the program to allow the program to be run as a part of the systems by operating computer personnel and completes system documentation to enable a subsequent programmer to make changes as may be required. The programmer should also be able to revise existing programs to make refinements, reduce operating time or improve present tech-

niques."

The programmer job calls for one year of experience and a college degree or the equivalent (three additional years of programming experience).

• **Computer Hardware Specialist:** "He reviews computer software systems and data requirements as well as communications and response needs and devises computer hardware configurations to support them. He analyzes computer programs in terms of computer and communications hardware and develops techniques to improve systems throughput and optimizes hardware utilizations. He evaluates computer hardware systems relative to their ability to support specified requirements, and, by determining potential and actual bottlenecks, improves systems capacity through recommended hardware changes.

"He is well versed in hardware compatibility. He has participated in the design of real-time or remote access systems and has working knowledge of process control and/or large time-sharing hardware systems."

He must have a minimum of four years' experience as an analyst or programmer, college degree or equivalent, and he must have a minimum of two years' experience as either a computer hardware specialist or as an analyst where specific duties can be demonstrated to include hardware specialties.

• **Computer Software Specialist/System Engineer:** "He reviews computer software systems and data requirements as well as communication and response needs and determines operating systems and languages to support them. He analyzes computer programs in terms of hardware and operating system compatibility and utilization. He is familiar with compilers and other language translators and can determine costs for converting computer programs from one language or machine to another.

"Given the constraints of the operating system and the hardware, he can structure software programs to operate within the environment. He improves software systems efficiency through recommending better utilization of operating system capabilities. Minimally, he has participated in the design of one oper-

ating system and had working knowledge of the systems of three manufacturers. He has acted as a systems analyst and programmer and has programmed in assembly language as well as several higher-level languages. He is familiar with queuing techniques and job sequencing controls within a multi-programming environment.

He has a minimum of four years' experience, college degree or equivalent, and a minimum of two years' experience as a software specialist or as an analyst working in that area.

• **Technical Information Specialist:** "He specializes in the application of computer technology to bibliographic and other textual information. He analyzes and develops indexing and abstracting techniques. He can evaluate retrieval methodologies... He has worked in the library field and participated in the design of large computer-supported technical information systems."

This job calls for four years' experience as a programmer or analyst and a college degree or equivalent.

• **Technical Automation Specialist:** "He reviews laboratory experimentation equipment needs and determines computer hardware and software support. He has working technical knowledge of laboratory equipment as well as analog-to-digital converters and small real-time computers. He has conducted research in automated laboratory environments or has designed and implemented process control systems."

The job calls for a minimum of four years' experience and a college degree or equivalent.

• **Communications Specialist:** "He is technically experienced in the area of data communications and transmission and analyzes computer software systems, data requirements response times and computer hardware configurations relative to the communications and data transmission requirements.

"He reviews communication networks as to their ability to support data processing requirements. He recommends changes to transmission networks, both in terms of hardware devices and switching points required to improve network performance... He has working knowledge of coding and error detection methodologies. He has participated in the analysis, design and implementation of communication networks including data processing transmissions.

"He must have a college degree or the equivalent and four years' experience as a communications specialist or in an allied area where specific duties can be demonstrated to include communications applications."

• **Coder/Programmer Aide:** "The coder or programmer aide is capable of translating detail program flowcharts into program-coded instructions used by the computer. He must have a minimum of one-year's experience as a trainee or junior-level programmer."

List Hourly Rates

Firms agreeing to the Basic Ordering Agreement must list the hourly rate for each job classification. When the government needs to go outside of its in-house capability, then Region 3 can recommend the user agency contract with one of the firms on the BOA.

The hourly rate charged must be applied evenly to all government users, that is, if a firm charges one agency \$10/hr for a programmer, that price must be available to all other user agencies.

Since the list of prices is public knowledge for the 50 firms that have signed the Basic Ordering Agreement, several sources have suggested the individual users could check with the list to make sure that their software service suppliers were not charging them more than they are charging the government for the same work.

Programs Take Some Heat Off Building Costs

Special to Computerworld

SYDNEY, Australia — Computer programs developed by Australian research engineers allow more realistic prediction of the air-conditioning requirements of

buildings.

The computer method of estimating optimum conditioning plant sizes for a wide range of climatic situations and of building types are faster and more precise than calculations from empirical tables and allow adjustments in plant capacities to meet particular conditions.

Three programs have been developed by the mechanical engineering and building research groups in the Australian Commonwealth Scientific and Industrial Research Organization.

One of the programs allows energy requirements and running costs to be predicted and the size of plant required for a particular building to be estimated.

Another air-conditioning program deals primarily with estimating the heat load of particular buildings as influenced by their shape, orientation, insulation values of the construction materials, including windows and the reflectivity of external walls.

Ex-ACM Head Forsythe Dies

PALO ALTO, Calif. — George E. Forsythe, former president of the Association for Computing Machinery, died here recently.

Forsythe, 55, was chairman of Stanford University's computer science department since its formation in 1965, and was the author of more than 40 research papers and three books.

Disk-Oriented Century 101 Upgrades 100

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sec are available.

In addition to the Century 100 peripherals, the Century 101 includes the 657 disk drive with a capacity of up to 59.6 Mbyte/unit. The drive had previously been offered only with the 200 and 300 Century models. A special model of the NCR 260 data terminal is also available with the 101. The thermal console printer is rated at 30 char./sec by the company.

The communications controller, a new unit, will be offered with all models of the Century series. The multiplexing unit can handle up to 256 lines with a total throughput up to 50 kbit/sec. The unit

features an integral timer for the multiplexer in addition to a timer for each line adapter. IBM-compatible bisynchronous operation is available as well as asynchronous and synchronous modes.

Redesigned cabinetry allows the inclusion of a 10-line communications adapter with a 64K memory into a single basic Century 101 CPU enclosure.

Because of its larger random access file capacity and increased communications capability, the Century 101 is expected to replace the Century 100 in many installations, NCR said. The better price/performance of the newer model will be partially offset by the economies available to the 100 user through long-term leases that will not be offered initially with the 101.

The newest Century is also expected to appeal to the users, or prospective users, of such systems as the IBM System 3 Model 10, Univac 9200 and 9300 and the Honeywell 115.

A typical 101 system consisting of a 32K processor, 8.4 Mbyte disk drive, 300 card/min reader and 450/900 line/min printer costs \$128,200 and rents for \$2,750/mo. First deliveries are scheduled for October.

Compiler Proves Faster

(Continued from Page 1)

basic package, with a reasonable range of options, is expected to cost approximately \$5,000.

Installation and one year of maintenance are included in the purchase price. Modification and inclusion of non-standard features may be contracted on a fixed price basis, CLI said.

The company may be contacted through P.O. Box 424, 12180.

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Who needs problems?



UNIVAC DCT-500
SPERRY RAND

At the Northwestern CW Caravan...

Predicting Performance Possible... After the Fact

SAN FRANCISCO — Users can tell how inefficiently their systems are working after installation, but there is still no way to predict performance of particular systems or applications before installation, speakers and attendees agreed here last week at the forum on operational efficiency during the Northwestern Computer Users' Forum and Exposition.

The group agreed it is now possible — and often profitable — to take applications off of large systems and run them on smaller, dedicated computers after they have been made operational.

To date, the only way to predict system performance is after the fact, when the user has a history of the job, according to panelist Ben George of Stanford University.

Accounting for computer systems has become extremely complex since the advent of multiprogramming, he indicated.

Stanford, he said, charges users based on CPU time, and I/O counts. Keeping such records for all transactions, he said, has some interesting byproducts in determining actual resource use in the system.

By keeping careful historical

records a user can begin to predict how efficiently new applications or programs should run, he added.

Panelist Joe Roman of Bechtel said the biggest problem with using small, dedicated computer systems for many applications in the past has been one of cost, but today that cost is falling.

Organizations with widespread operations, he said, have a choice between going to intelligent terminals or the dedicated systems. Bechtel chose the dedicated route, he indicated, because it found it would have "massive" scheduling problems with the intelligent terminals.

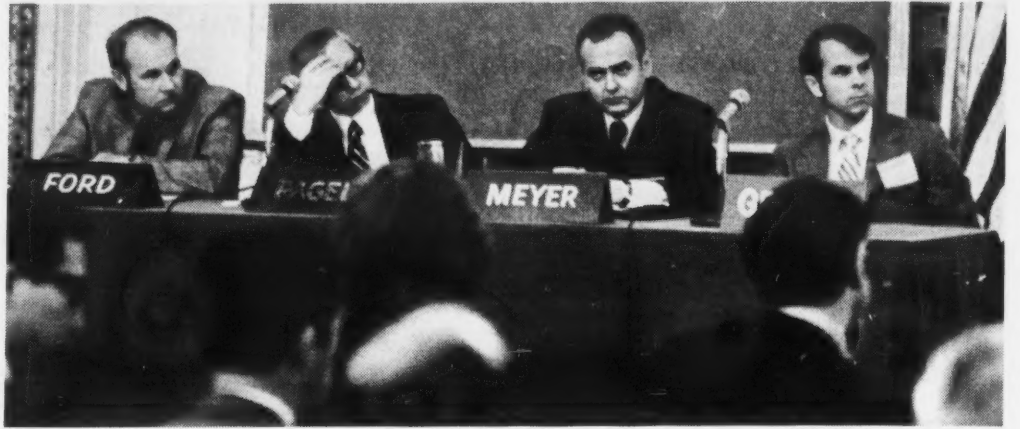
Charles O. Meyer of Kaiser En-

Caravan Set for '73

The Computer Caravan visits Chicago this week (April 18-20) and winds up in Detroit next week (April 25-27). The spring 1973 caravan will start in Washington, D.C., in February and end in Boston in May. The other stops include Miami, Houston, Los Angeles, San Francisco, Chicago, Detroit and New York.

gineers told attendees at his workshop that users going to multivendor systems with independent peripherals must not just worry about compatibility with their IBM mainframe, but should also consider the compatibility among all the independent suppliers.

He noted that small organizations could take advantage of independent equipment as well as companies with large mainframes, but that management



CW Photos by E.J. Bride

Panel session for the third day includes (from left to right) Marvin Ford, Joe Roman, Charles O. Meyer and Ben George.

must become involved in the move in the smaller companies.

Kaiser has less than 25 employees, he added, in data processing but was able to save 20% to 25% on its hardware bills, "but the better performance" of the independent equipment "overshadows" the cost savings.

The independent (and extended) core offers users "equal

to or better than IBM" performance, according to Marvin Ford of Standard Oil.

Operational Efficiency

By adding core, he said, the user can develop "truly effective" multiprogramming and can

add new capabilities to his system. For example, he said the addition of core allowed his firm to bring outside time-sharing in-house and it has allowed it to perform program development more effectively.

He indicated that the move saved his firm over \$16,000/mo, while getting better performance.

Equipment Exists for Real Wired City

SAN FRANCISCO — The wired city would be here, if computer users would only take advantage of existing equipment, according to Dr. Robert Linebarger, of the Nasa Ames Research Center.

Panelist Linebarger said that existing twisted-pair wiring on campuses and in large businesses could enable users to establish computer capability, with terminals, throughout their facilities.

Keynote speaker Dixon Doll added that CATV systems will also bring this capability to residential areas, and he also predicted that the specialized common carriers and CATV outfits

would be involved in technical and business arrangements "before year's end."

Communications

In pointing out the "staggering attractiveness" and low error rates of twisted-pair wiring for data communications, which "most organizations have readily available," Linebarger said this technology represents a breakthrough for users; the technology, only two or three years old, has been "overlooked," he noted.

On another issue, Linebarger

said users could achieve savings on the order of 10 to 1, "not just 20% or 30%," by investigating independent modems.

Specifically, he said if a user evaluated the Bell System 2400 baud modems against a 9600 baud, independently-supplied modem, the price/performance break is the area of "500% to 1,000%."

Users who can troubleshoot the lines they use in the dial-up network to isolate faults and error conditions can save themselves a lot of downtime, according to panelist Les Baker of Standard Oil of California.

"It takes a while to get help from the phone company," he told his dial-up workshop, "and if the user can tell the phone company exactly where the problem is in the line or equipment he will save a lot of downtime."

In a highly divisionalized company like Crown Zellerbach, a modular course of action in data communications is recommended, said workshop leader Chuck Vancura, manager of corporate telecommunications.

In order to coordinate the communications efforts, Vancura chose to stay with a mainframe maker for his front end, thereby achieving more flexibility in "building for the future."

Turnkey software was one advantage, he noted, adding, "we looked at software houses" but discounted them "because we couldn't afford them."

Crown-Zellerbach settled on a Control Data Corp. front end, and "we don't mess with the CDC operating system."

Another user at the data communications session found just the opposite with his operating software. Mike Murphy of the Dole Co. said his DOS and Power were "not clean," and a technician at Data 100 "wrote our compression routine for us."

Dole uses two 360/40s in Hawaii, where the pineapple plantations are operated. Terminals at division headquarters in California perform remote job entry for Dole.

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Key-to-Disk Controls Output Better

SAN FRANCISCO — It takes operators about three months to begin working up to standards after switching from keypunching to key-to-disk data entry, according to panelist Mary Lanan of Pacific Gas and Electric at last week's keypunch replacement workshop.

She said operators would average 7,500 keystrokes during an eight-hour day with the key-to-disk devices, and pointed out that one shift in her shop maintained over 11,000 keystrokes during its shift.

Pacific Gas, she said, was able

to cut its labor costs by 16% with key-to-disk equipment, but machine costs were up about 25%. There was a net savings, however, since the personnel costs were the largest part of the budget.

Data Entry

Herb Walker of Crocker National Bank told his OCR workshop that the true cause of input problems is paper. He told attendees that the "obvious solution" to the paper problem can

be found by discovering and using the true capabilities of OCR.

While the future of OCR may lie in a low-cost, single-font machine, this is three or four years away, Walker suggested. While it is technologically possible to acquire equipment that can recognize almost any combination of type styles, this equipment is expensive and few users would be willing to undergo that expenditure, he commented.

Ken Iverson of Amfac told his intelligent terminal workshop that the use of intelligent terminals allows a firm with many branches or subsidiaries to standardize formats, thereby reducing errors.

The units also allow a firm to reduce turnaround and provide upward flexibility that allows the user to go to direct data entry when he is ready, he said.

For some applications direct data entry is the overall solution, he indicated, but intelligent terminals allow the user to "walk before he runs."

The intelligent terminal can serve as a bridge between the old methods of operating a computer center and the direct online data entry for applications that are not ready for direct entry.



Digitronics line printer with open yoke has some admirers.

Poor Planning Cited for Inadequate T/S

By Edward J. Bride
Of the CW Staff

SAN FRANCISCO — The shortcomings of computer time-sharing are largely "the fault of the computer companies" who introduced the third generation "a year or two too soon, and didn't plan for time-sharing."

Prof. John McCarthy of Stanford University also said "suitable" time-sharing systems must be perfected before his personal goal of home terminals can be achieved.

Addressing a luncheon crowd of about 400 attendees during the recent ACM Northwest Region Symposium here, McCarthy said the benefits of home terminals would include individualized educational opportunities, better access to world literature and innovations in shopping.

The attendees represented most of the 16 chapters in the Northwest Region of the Association for Computing Machinery.

In the opening keynote address, state Sen. Milton Marks called on the computer industry to "eliminate the annoyances" of computer-related errors. "The consumer has a right to be protected,"

Marks said. "We all know that the accuracy of the computer depends on the accuracy of the programmers and operators," and that accuracy can be achieved "without the necessity of the state stepping in."

Marks also opposed property taxes on computer software. Noting the "temptation" of government to find new sources of revenue, he said a better approach would be to "institute severe economies and pass meaningful tax reform legislation" this year.

The unemployment rate in California is 5% of its 20 million citizens, he added, and "the state must do something" to achieve full employment for its technically trained people.

Addressing the more general topic of computer usage, Marks said computer people must seek "new, efficient, more economical means" to solve pressing sociological problems.

Computer storage of world literature, "or at least a significant portion of it," would be one such example, according to Stanford's McCarthy, who acknowledged there are technical problems involved.

The limitations of time-sharing, however, are "not as acute as others," he said, "such as getting all the programs written." The problems in programming, he noted, are largely due to the lack of standardization in languages.

McCarthy said one of the two chief problems in time-sharing, and therefore in the use of home terminals, could be solved by the conference's attendees: language standardization for interaction.

The problem of unsuitable time-sharing systems will be lessened when IBM comes out with a general-purpose time-sharing system to sell to users for commercial applications.

One trouble with the computer industry, he explained, is that things don't seem to count "until IBM does them. IBM dropped the ball on time-sharing," he charged, noting debugging has to be done with a card deck, and "you have to bring down the system (he used the 360/67 as his example) to develop new applications."

This first Northwest Regional Symposium, with the theme of "computer tech-

'Consider the User'

SAN FRANCISCO — "Idiot-proofing" an interactive program requires more effort, more storage and extra run time, but there are advantages to the end users, noted Anthony Wasserman of the San Francisco Alliance for Health Care.

Wasserman told "human interface" workshop attendees at the ACM symposium that the decreasing cost of computer time should be weighed against the extra run time, and that a higher degree of user satisfaction, and the greater ease of program use must be considered in writing and evaluating interactive programs.

nology today — development and innovation," was almost entirely technical in nature. A broad range of workshop topics included the design of "idiot-proof" interactive programs, software engineering for business systems, artificial intelligence and social implications.

About 10 manufacturers provided minicomputer, terminal and calculator equipment for an "open classroom" workshop for educators, which ran all day.

In a "human interface" session, Peter J. Denning of Princeton chided computer technicians for their "buzzwords." He entertained about 150 attendees as he suggested communicating with the outside world, or with foreigners who know English, is made more difficult by such words as "bugs," "execution store" and "gang punch."

"Terminology inadequacies" are acceptable in a new technology, he said, "but we're not that new anymore." A few attendees at his session took the opposite view, that computer colloquialisms are spreading into general usage.

"Automobiles have bugs, radios have bugs, everyone knows what a 'bug' means now," one said.

THE COMPUTER INDUSTRY: NEW DIRECTIONS IN THE 70's

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ACM-ASA Meeting Stresses Need For Measurement of System Use

By Don Leavitt
Of the CW Staff

HAWTHORNE, Calif. — Measurement of computer systems utilization provides a bridge between design promises and operational performance, and there are a number of measurement tools available to build such a bridge, according to Arnold F. Goodman of McDonnell Douglas Astronautics Co.

Goodman made his remarks as panel chairman of a joint Association for Computing Machinery (ACM)-Association for Systems Analysts (ASA) chapter meeting here recently. He said there had been a "quantum jump" in measurement tools — including both hardware and software monitors — in the past two years.

The how and why of management's use of measurement to control major systems were outlined by Charles S. Perry, also of McDonnell Douglas.

Time, cost and machine estimates of computer projects are inevitably optimistic, but management does not always have past experience to help recognize the optimism and perhaps eliminate it, he said.

Perry described the complementary nature of the analysis of systems, generally at the component level, and simulation, which provides an overview of the entire system. But simulation is very sensitive to the user's assumptions, he added. If it is a good simulation, it faithfully copies every error the analyst makes.

Testing procedures must be considered part of measurement, and testing must begin at the start of any project, according to Thomas B. Brerton of the Naval Electronics Laboratory Center. Testing must be done in parallel and not just in sequence with program development, he said.



(CW Photos by E.J. Bride)
Arnold F. Goodman



Thomas B. Brerton

development than during operations, he added.

'For Want of a Nail'

Brerton reminded the audience of the \$48-million rocket that had to be destroyed in flight, because a comma had been left out of a guidance program and the "bird" was responding to the wrong commands.

Fine tuning of an entire hardware-software system is another important area of measurement, Thomas E. Bell of the Rand Corp. told the joint meeting — "especially if you'd like your third or fourth generation CPU to work better than your first or second generation equipment."

Tuning used to involve choosing hardware, writing programs, doing some measurement and then wondering what to do with the data developed. This haphazard evaluation can be worse than worthless; it can be seriously misleading, Bell said.

Understand Total Systems

Rather, the DP manager should try to understand his total system, the organization of his staff, the available hardware, the software and his methods of accounting for time and effort. He should then analyze the characteristics of the overall system and the jobs that it includes. He should also look at current measurement and evaluation activities before formulating improvement hypotheses, Bell added.

Follow through on one hypothesis at a time, he warned, so that the effect of the proposed change can be thoroughly understood, before it can do any unexpected damage. Unless a change leads to a positive improvement, it is probably better to leave it out, he suggested.

If the emphasis of the tuning effort is on a hypothesis testing approach, the analyst can then easily answer many of the common questions concerning what to measure, which measurement tool to use and what to do with the resulting data, Bell concluded.

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City DP Community Studied

JERSEY CITY, N.J. — An eight-page analysis of Jersey City's data processing community summarizes the DP experiences of 59 firms including manufacturing, distribution, commercial and financial, medical, consulting, educational and governmental users.

An indication of growth is that reported DP users have increased in number from 15 in 1967 to 33 in 1969 to 59 in 1971.

The report lists 18 different DP equipment classifications and 769 separate units. Nine types of computer language are chronicled as well as 10 alternative operation systems. Under the category of personnel over 600 employees are described in terms of function and salary.

Consumer Complaints Analyzed

PITTSBURGH — Westinghouse Electric Co. is initiating a program to analyze consumer complaints and preferences.

Each time a serviceman makes a call, he records the customer's thoughts on all aspects of the product, not just the problem area. These thoughts, as well as information gathered from mailers and surveys, will be fed into a computer, where trends in style preference will be detected.

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Now there's an easy, economical way to expand IBM System/360 or 370 memory: add on Monolithic Main Memory from ITEL. (The Monolithic Main Memory is manufactured to ITEL specifications by Advanced Memory Systems of Sunnyvale, California.)

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The secret of ITEL's superiority over IBM core is found in its basic monolithic memory module. This semiconductor chip contains 1024 bits of storage. These memory elements are fabricated in batches of thousands, which cuts costs dramatically. And most wired interconnections are eliminated, so there are far fewer potential sources of failure.

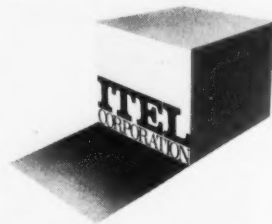
But even monolithic memory elements can sometimes fail. That's why ITEL has ECC: Error Checking and Correction. Should a memory

element fail, ECC corrects the error instantly. There is no effect on computer operations or processing. The operator is notified by an error light and maintenance can be performed without interrupting the memory's operation.

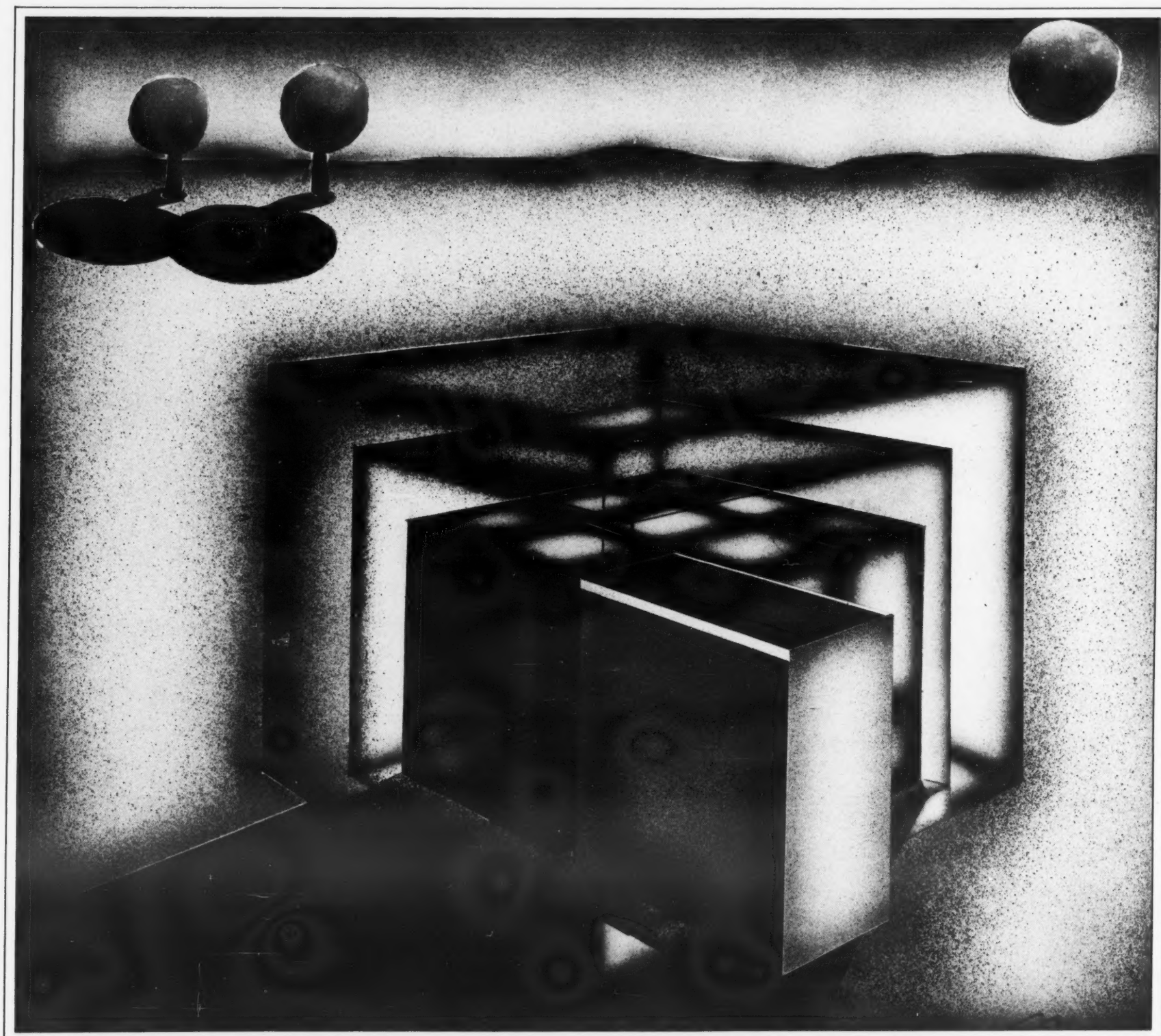
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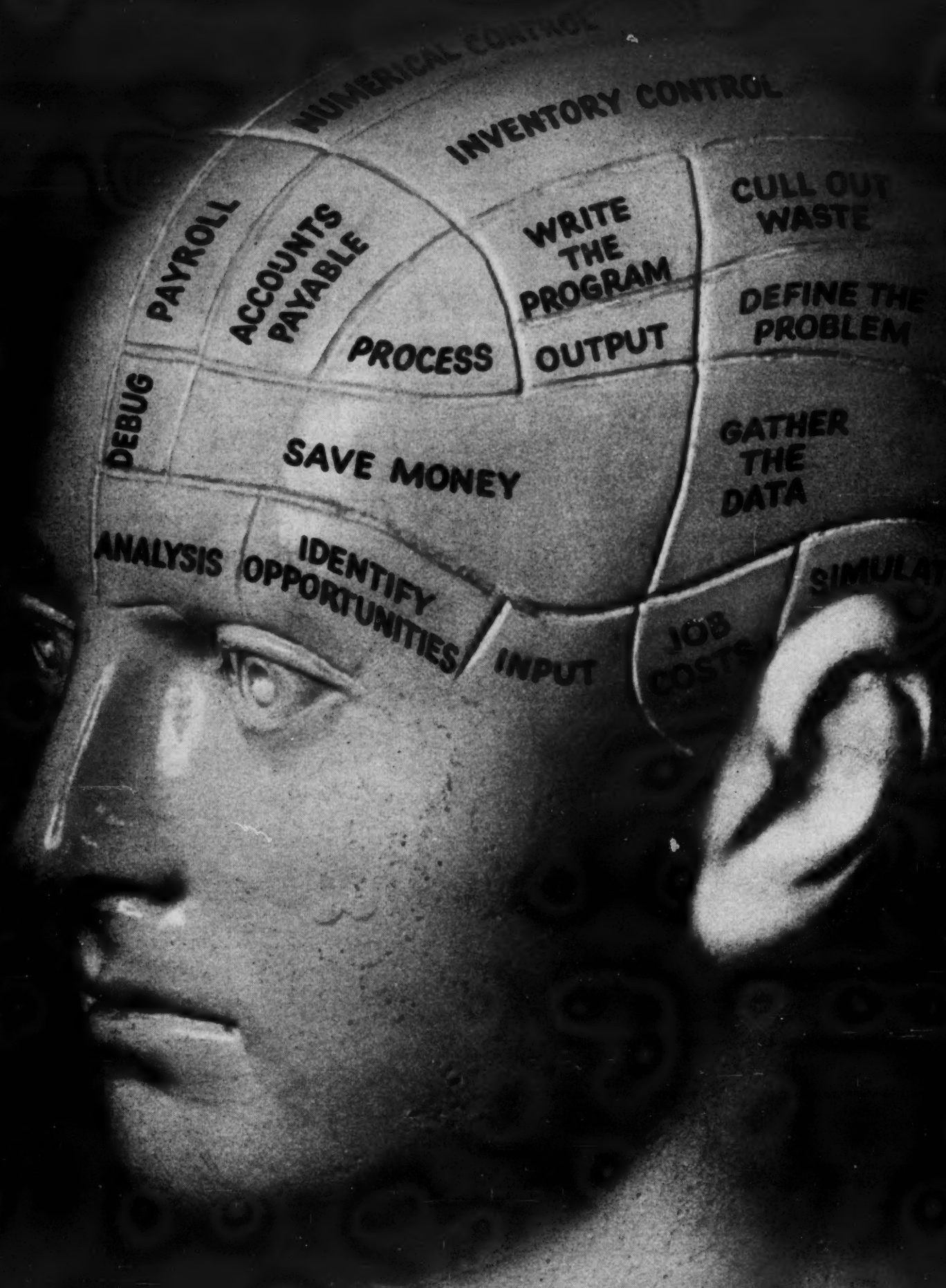
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Special Report

Output Techniques, Part III

"Off-line printing is more economical than on-line operation. And it also increases the user's scheduling flexibility." — Carl Cutrone of Mohawk Data Sciences Corp.

Off-Line Printing: How to Ease Through Bottlenecks

- Users Like It as Main Print Method
- Speed Is Not Nearly as Critical

By Ronald A. Frank
Of the CW Staff

As users continue to increase the number of jobs run on their processors, they also must find ways to improve their throughput capabilities.

The best solution is usually to install a larger mainframe. But more and more users are analyzing their processing bottlenecks and find a significant portion of their CPU time is devoted to printing. Enter off-line printing.

"Off-line printing is more economical than on-line operation. And it also increases the user's scheduling flexibility," according to Carl Cutrone of Mohawk Data Sciences Corp. in Herkimer, N.Y.

Mohawk, which has offered off-line print stations for about two years, supports "some 90 off-line print station formats" including IBM 360 outputs such as Power, OS and DOS, he says. "We do formats for IBM, Univac, GE and ICL, and we have supplied off-line print stations for all those types of systems."

'Users Eager'

"Users are eager to go completely off-line with their printing operation," Cutrone adds. And most customers are switching to off-line as their main printing method rather than using it only to supplement on-line operations, he believes. "This is definitely a price/performance situation that will benefit the user."

The obvious advantage of off-line printing is that the user's CPU no longer has to wait for a relatively slow device like a line printer, according to Dick Holtzman,



The Diva off-line printer includes a mini and accepts standard IBM disks instead of tape.

marketing manager for printers at Digitronics, Southboro, Mass.

With an off-line printing operation, speed "is not nearly as critical," Holtzman says. The off-line printing capability has to be fast enough to handle the total workload. And some users prefer to replace a 1403 with several slower printers operating off-line, he feels. Even if one printer goes down, another is still available, says Holtzman.

Digitronics supplies a 200 line/min, IBM-compatible printer for System 3 users and those with 360/20s and 30s. The Digitronics 200 printer accepts print tapes from IBM CPUs for off-line operation, Holtzman notes.

While most off-line printers work from

magnetic tapes, at least one company thinks the disk to printer is the way to go. Diva Associates, Red Bank, N.J., has announced an off-line print station that uses "print disks" instead of print tapes.

"We're giving the user a lot more capacity and a lot more speed than tape-oriented off-line print stations," Diva's vice-president for marketing, Dave Britton, says.

The Diva system is more than just a print station. It includes a Data General Nova 1200 mini which acts as a buffer and also reads any "formatting on the disk necessary to get the data out on the printer," Britton says.

Many IBM users don't have tape, Britton says, "and many of these customers utilize a Hasp program which allows them to spool their data onto a particular disk drive." With the off-line station, the user can take the disk pack with the spooled data and move it off-line for his printing operation, according to Britton.

The Diva print station will be compatible regardless of the IBM operating system used, Britton adds. "We are able to recognize IBM's printing control characters through software in the print station mini."

"The IBM user who is printing on-line is paying between \$60 and \$120/hr," Britton claims. With the Diva disk-to-print station, this cost could drop to \$25/hr, he believes.

Two versions of the Diva system will be available, one to accept 2316 disk packs and the other for 5440 disks used with System 3. Both systems use a 600 line/min impact printer supplied by Data Printer Corp. The S/3 version will rent for about \$1,070/mo while the 2314-type system will cost about \$1,285/mo, according to the firm. "We have a demonstration system operating in-house and we expect to install our first print station at a user site soon," Britton states.

One company that favors drum printers for off-line operation is Data Products Corp. in Woodland Hills, Calif. "Many of our off-line customers belong to the banking and financial community," says Gordon Lundbeck, manager for printer systems support.

"Our tape unit can read virtually any tape including 7- and 9-track, all the way from 200 to 1,600 bit/in. on the same drive, Lundbeck says. The firm describes itself as the "IBM of off-line" and some observers agree more than half the off-line print stations now operating came from Data Products.

Develop 'Own Printer'

Because it favors the drum-printing technique, Data Products has not attempted to replace IBM printers operating on-line. "In the future we will probably develop our own printer like the 1403," Lundbeck promises. "But the chain printer is still too costly," he adds.

"The 1403 chain normally lasts no more than six months, and even if IBM replaces it, it still costs about \$2,200 every time it wears out," Lundbeck adds. "Since most IBM printers are on rent, field personnel install a new one, and the user is often

unaware that the chain has been replaced," according to Lundbeck. By comparison, the drum usually lasts from "four to five years" and this is close to the life of any product, he says.

Off-line print stations have been recommended to 360 users to increase the life of their systems. A 360 enhancement study in 1971 by Compata Inc. for the Computer Lessors Association estimated

that "print-bound" 360/40 users could get 10% to 20% throughput improvement with the addition of an off-line print station.

User Criterion?

While it is difficult to estimate how large a printing operation has to be before an off-line station is practical, a study by (Continued on Page 11)

Forms, Paper Suppliers Not To Be Neglected

While most printer users carefully evaluate specifications such as operating speed, available fonts and character sets, many overlook paper and forms control.

"In some cases we can cut a user's printing time by 50% by looking at his printing operation," Rod Leavell, district manager for Moore Business Forms Inc., Niagara Falls, N.Y., claims.

Savings like this are possible if the user is working with a narrow form that can be printed two-up instead of single runs, thereby doubling the printer throughput, Leavell explains.

Systems Analysis

Such increases in efficiency will not always be possible, but the forms and paper suppliers do provide beneficial systems analysis (free of charge in most cases) to users.

"The speed of the printer is directly related to the number of lines that the user has to print out on each form," Leavell notes.

For example, some users print invoice number and the date on separate lines. "If you rearrange the form and combine this information on the same line, you have saved one line of print." This may not seem like much of a savings, but it could equal "several hundred thousand lines of print time per year" for some users, Leavell states.

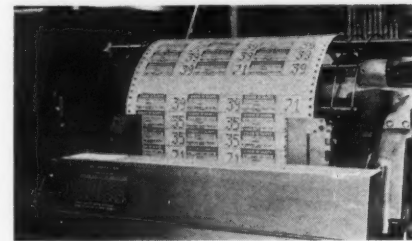
Shorter condensed forms can also save on total cost per form and the user will not be skipping as much blank space on his forms handling equipment. This type

Bursters, Deleavers...

Many of the forms suppliers also provide the user with various accessories designed to speed up his printer output. Although much of this equipment is tailored to specific applications, some units are of general interest.

The forms burster is used to separate continuous form printouts after the paper leaves the printer; the carbon deleaver separates carbons from printed copies when conventional multi-part forms are used.

Use of NCR-type carbonless paper can eliminate this procedure. Other types of units include collators, sorters, slitters and stackers. Forms suppliers usually can advise the user on selecting the required time-saving accessories.



Customized forms like these labels being printed "three-up" can reduce costs and cut print time.

of equipment runs at fixed speeds of inches per minute of paper, so shorter forms move faster, Leavell maintains. Bursters and decollators to remove carbons are included in this category, he says.

Although larger DP users often have internal systems and forms design specialists, "we often are the systems department for a smaller user," according to Leavell.

The Standard Register Co. in Dayton, Ohio, provides special multi-part forms to produce a mimeograph master as one of the copies typed by the printer. Other special forms include plastic ID cards that are pasted on sprocket-fed paper for insertion into a printer.

Standard Register salesmen can supply valuable data to users. The firm has produced "data processing forms specifications" for most high-speed printers installed at user sites. Included are specifications dealing with carbons, paper weights and machine-operating data for equipment supplied by IBM, Honeywell, NCR, Univac and others. The firm also has a free booklet on "The Care and Feeding of Forms" for high-speed printers.

Systems Support

As part of their systems support, the forms companies do more than talk to the printer operator. In many cases, with the customer's approval, the forms specialist will talk with the people who receive printed copies in the user's distribution chain.

A typical forms systems study may take a team of salesmen and analysts "at least two or three days," according to a spokesman. During these studies, paper movements are flowcharted, "and the results can be an eye-opener to the user," he says.

"Sometimes we find an employee who receives thousands of copies per year of forms and reports that he doesn't really need," a forms specialist claims. "He may have requested a copy once and in the interests of building his little empire, he never took his name off the distribution list."

In addition to being a waste of paper, the extra copies, when multiplied over a year, can be translated directly into wasted CPU time, the specialist adds.



The Tally Datascribe and printer can be used for remote printing via communications lines.

How to Improve User Throughput

(Continued from Page 10)

Creative Strategies Inc. says "large computer users that generate more than five million forms a year will find the off-line method very attractive."

There are other benefits of off-line printing besides the obvious like reducing CPU time. With an on-line operation, if a form is misaligned, the operator usually has to perform a restart procedure and begin anew, according to Data Products' Lundbeck. But when an error occurs with an off-line print job, the operator can simply back up the tape "an inch or two" and reprint only the incorrect portion of the job, he says. And multiple copies which require more than one print run involve simply rewinding the tape and running it again, he adds.

One off-line printing devotee is United Artists Theatre Circuit Inc. "We increased our throughput between 250% and 300%," says Frank S. Dysart, DP manager.

The firm has a 360/20 and all printing output was originally done by an IBM 2203 print unit. To replace this on-line operation, United installed two 600 line/min print stations supplied by Tally Corp.

To understand just how efficiently Dysart manages to drive his Model 20, it should be added that the CPU does all the processing for a chain of 300 theaters, plus some CATV systems, real estate, shopping centers, and some "smaller operations." "Our printing jobs include everything from preprinted, partially



Data Products off-line print stations include a tape transport that will accept print tapes from most mainframes.

completed order forms and time sheets right up through the corporate financial statements," Dysart affirms.

United keeps "about 325 active programs" on the Model 20 and the firm is now starting to supply time to outside customers, the user says. Asked if his CPU wasn't just a bit small for the scope of his operation, Dysart maintains he strives for "efficient utilization of his CPU throughput." And much of this efficiency can be attributed to the off-line printers.

With the success of the two Tally off-line print stations, the 2203 has been relegated to a console printer "that sits there much like a typewriter," according to Dysart. But not being a user who wastes any equipment capability, the DP manager adds, "We keep single-ply paper on it for logs and audit lists of data going into the Model 20."

Remote Print Stations Coming Closer

For users of off-line print equipment the movement of print tapes from on-line drive to off-line transport offers an interesting option. Instead of transferring tapes manually in-house, data can just as easily be transmitted tape-to-tape to a remote location.

But many users needing a remote printing capability will not settle for just a printer. Instead, they install a complete remote batch terminal.

Users will probably install many remote batch terminals for every remote printer, according to Dave Beaber of Arthur D. Little. But regardless of how the equipment is classified, users realize the need for remote printing output. In addition to the tape-to-tape transmission of data, some users are operating their remote printers on-line.

"We see indications that the remote print station will increase sharply. And a printer operating at about 100 or 165 char./sec allows the user to maximize the

use of a voice-grade phone line," according to Philip Sweeney of Printer Technology Inc., Woburn, Mass.

"Our 100 char./sec printer can operate from 600 bit/sec all the way up to 1,200 bit/sec and we process the data much faster than a teletypewriter," Sweeney says. This type of operation using dial-up lines is becoming more popular with users, Sweeney believes.

And when this user grows out of his on-line operation because he is transferring too much data, he can add a tape transport and go to tape-to-tape transmission, Sweeney adds. Using this concept the user would grow into an off-line remote print station as his operation expands.

One company that has concentrated on supplying remote printing equipment is Tally Corp., Kent, Wash. "We have a 100 line/min printer which is appropriate for remote site printing," says Dave del Valle, marketing manager for business systems.

Remote printing is actually a form of

off-line printing, del Valle thinks. "Instead of doing a large printing job in the computer room and mailing the paper the user transmits the data and then does the printing."

Tally can supply users with a remote printer operating on-line with an off-line print station on the other end.

The CPU print tape is mounted on a Tally Datascribe V820, which looks more like a key entry device than a print station. The Datascribe contains a modem which transmits the data from the print tape to a remote printer operating on-line. The advantage, according to del Valle, is that the user eliminates the tape-to-tape transfer time and transmits directly to the printer.

This type of system would cost about \$525/mo with the added flexibility of using the Datascribe unit to generate tapes from a keyboard, when the device is not transmitting.

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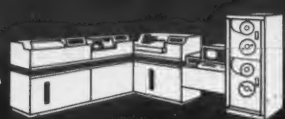
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Editorial

What's in a Title?

One shop's junior programmer is another shop's systems analyst, a situation that makes it very difficult for outsiders to know who they are really dealing with.

The General Services Administration has now put an end to this confusion, at least on federal software contracts, by defining 10 data processing titles, from project manager down to coder.

The GSA admits its first version isn't perfect, and we agree. But it's a start on a national standard that is long overdue.

Tax Incentives Needed To Spur Applications

The U.S. computer industry is a troubled giant. In the past 24 recessionary months the rate of growth in expenditures for new applications in the U.S. has slid sharply. Such reductions hurt the computer user and deprive our industry of the new applications know-how it needs to sell hardware overseas — an important factor in our balance of trade and our total economy.

Bema's Data Processing Group recently pointed out that from 1963 to 1970 the computer industry's positive contribution to the U.S. balance of trade rose from \$180 million to just over \$1 billion.

During the same years, our industry's percentage contribution to the positive side of our trade balance rose from 2.9% to 37%. In 1969, our contribution was almost 50%.

National Threat

The reduction in private funding for the development of new computer applications, however, presents a true national threat. A threat we must see gets adequate notice.

Officials in Commerce, Treasury and on Capitol Hill should seriously consider that it may be in the best national interest to provide economic incentives for the development of new computer applications — such as tax incentives and outright grants.

Sherman Abrahamson, director of planning for the Bureau of International Commerce, believes a bill before the House Committee on Government Operations would be a beginning in this direction.

The bill, according to Abrahamson, would provide \$100 million a year for "basic research in data processing technology." This sum would be administered by the National Bureau of Standards and would be available to private industry under contract to the bureau.

Although the bill appears to have a fair amount of support, the computer professional should take an active part in support of the bill, Resolution 13200, filed by Rep. Jack Brooks (D-Texas).

This sort of money, under the broad category of "basic research in data processing technology," might, for example, be used to finance the education of DP personnel in advanced systems development and implementation skills.

The courses could be given by private firms, at in-plant facilities, or at regular educational institutions.

Additional federal money might also be used to expand support for computer facilities and education at private and public secondary schools, colleges and universities. This would assure computer-using organizations of a growing pool of well-trained computer personnel in the future.

Educate Representatives

Abrahamson said he doubted there would be much support for tax incentives in Congress. Here again computer professionals must take an active role to educate their representatives in Washington toward tax incentives.

One possibility might be a 7% to 10% tax credit on the cost of developing new computer applications — including the cost of computer time and programming.

The Federal Government could also give a 20% to 25% investment tax credit for the purchase of DP equipment, rather than the 7% to 10% level given for other classes of capital equipment.

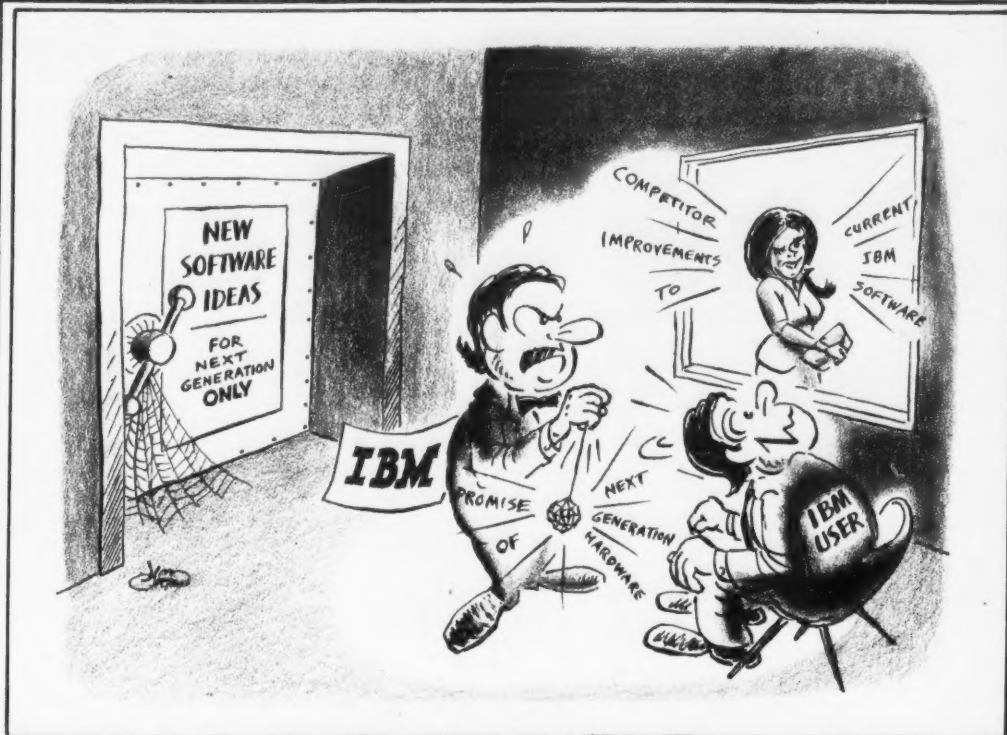
We could defend this proposal by noting that other countries, such as the UK, have provided "cash grants" of 20% to 40% to finance the purchase of capital equipment, like computers, that improve productivity.

The issue is clear. The nation cannot afford to let the great "skill resource" represented by our talented and experienced computer professionals go underutilized. Rather, it is critical that national policy provide computer users with incentives to examine and implement new applications... applications that will not only spur increases in national productivity but also support our international trade position by making our computer industry more competitive in world markets, through continued leadership in applications know-how.

Now is the time for members throughout the computer community to let their voices and views be heard in Washington.

Publisher's Overview

By
P.J. McGovern



'You're Not Paying Attention!'

Letters to the Editor

Users Find Vendor Can Change Contract

The articles in *Computerworld* on the need for caution in contract interpretation and negotiation are no longer a subject for idle speculation to NCR users and prospective users.

As of July 1, 1972, all NCR Century users will pay increased monthly rental even if they have multi-year contracts. This is possible because the contract allows for rental increases equivalent to increases in monthly maintenance rates.

The rental increase for a Century 100 with a five-year contract is \$110/mo. This is a 5.5% increase in overall rental, but it represents an increase of better than 40% in monthly maintenance.

The multi-year contract contains very specific and stringent penalties for cancellation by the user. In the case of this action by NCR, the user is allowed the right to cancel within 90 days of the effective date, July 1, of the price increase. This provision would seem to place NCR in a very vulnerable position as regards competitive pressures on its multi-year contracts. However, many users will not be able to do anything in this situation due to heavy dependence on Neat/3, the NCR programming language.

This action by NCR appears to be ill-advised. It will alienate many satisfied users with its high-handed approach to what many considered an ironclad agreement. The sudden discovery that their contract can be manipulated at will by the vendor will certainly result in a more cautious approach to future negotiations.

Jeffrey E. Ferris
President

Management Data Corp.
Mobile, Ala.

Taylor on Target With Core Article

Alan Taylor's article on IBM's

attack on the U.S. independent peripheral suppliers through its action on extended core installations beyond IBM limits [CW, March 22] was most interesting.

It seems to me there is nothing different, in kind in the modifications required to upgrade 360/30 to 96K or 128K bytes from those required to upgrade to 64K bytes. The people designing the modifications employed the same design techniques that IBM used. The documentation describing the changes was also the same as that used by IBM.

So I found it difficult to make the distinction that IBM chose to make on a technical basis. IBM's recent announcement of the settlement of the AMS/Itel-IBM suit is another example of these tactics. The wording chose to "clarify the accord" was far from clear and users will continue to be confused as to IBM's definition of "impractical to maintain."

I agree with the observations as to the reaction of the financial community to IBM's move and the impairment of the independents' ability to raise capital. We have heard this feeling expressed by many of our colleagues in the investment community.

However, our firm continues to be interested in start-ups and secondary financings of companies in this field. We like the data processing industry and feel we can help companies we invest in to surmount the problems caused by IBM's actions. We hope that would-be entrepreneurs will not be unduly discouraged. IBM has made it more difficult — but not impossible — to raise venture capital.

Russell J. Robelen

Idanta Partners
San Diego, Calif.

'Put Taylor Back In Editorial Section'

After reading *Computerworld* for several years, I find Alan Taylor's personal comments inter-

mingled with the facts are distorting your image of impartial reporting.

Please restrict the small front page to newsworthy facts and put Taylor's comments back in the editorial section.

I thank you for your continued reporting of the industry and the current state of the art.

James McCauley

Manager, Information Services
Anthony Industries, Inc.
South Gate, Calif.

Software Investments Part of Real World

Regarding Michael F. Smith's recent Viewpoint article entitled "User Lauds IBM's Present Software Strategies" [CW, April 5], it is worthwhile to point out that the life of any investment is the period of time over which that investment remains economically superior to alternative allocations of funds that might be made for the same purpose. This period generally ends before the investment becomes obsolete and depreciation is extended over the years of its economic life.

Investments in computing machines and software products are no different and, like plant equipment, must be retired when their useful life has ended. That is the real world!

Andrei Glasberg
Associate Director

The University of Wisconsin
Computer and Management
Services Division
Milwaukee, Wis.

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

Will It Be Microprogramming or Microcontrolling?

The freedom for users to choose what peripheral they want with the processor they want appears to signal the coming computer revolution. If someone would like to have a Control Data disk drive on his Burroughs computer, or an IBM 3420 tape unit on his Honeywell equipment — or anything else of this type — this will be possible. In fact, this freedom has been possible for some years, but only now is its power beginning to be realized.

The technical "magic" behind this is microprogramming. But this programming is not restricted, as many believe, to central computer programs. It can also handle the interfaces between a computer and its peripherals which nowadays is handled by controllers. In this position as a control mechanism microprogramming appears headed for its first user triumphs.

International Peripherals and

Computer (IPC) of Santa Ana, Calif., recently introduced a "universal" microprogramming controller which currently is program-interfaced to the IBM 360 channel on one side, and to the IBM 2314s on the other.

This is by no means the extent of its capabilities, but a reflection of the fact that there was a demand on the marketplace for such equipment. IPC is a new firm, and so naturally is concentrating on the immediately available demand, but it is not ignoring other possibilities.

In magazine articles, Kjell Hovig, IPC president, and Wayne Hodges, IPC vice-president, engineering, have handled the possibilities of such esoteric developments as placing virtual memory on System 360s, allowing the use of "virtual peripherals," etc.

But, while these things may be possible, they are still not a reality, and I think that it would be better just to consider some of the possible user applications of microprogramming at the controller level, considering simply the case of the same peripherals on the same equipment.

For instance, would you like to know what you could obtain if a suitably programmed universal controller were available between the tape units you now have and the computer you cur-

rently have?

Physical Factors Stay

Some things would not change. For example, if your tape drives currently work at 112 in./sec, they will continue to work at 112 in./sec. This is controlled by the motor in the drive itself and reacts to the signal from the controller only by going on and off, or by reversing direction.

But other things will change. The rate at which data is put onto the tape, or brought off the tape is changeable. These factors are not controlled by physical facts, except to within very wide ranges, but are controlled by time constants programmed into the controller. Once the controller can be microprogrammed, the use can adjust his time constants to get the best maximum speeds of data throughput that he wants in his installation!

Outside Restrictions Eased

Of course the answers the user comes up with as to the rate he wants may be affected by the fact that he has to send some tape to an outside installation that does not have the same microprogram in its controller as his own.

Under the current system this requirement would then mean that all user tapes must be restricted to this format. Not so under microprogramming. Here the user can write in one format for one tape unit, and in totally different formats for the other tape units! He can even write in different ways on his tape at different points of time from the same tape unit — just by pulling in separate routines.

There is real flexibility, but there are limits!

Flexibility Limits

Microprogram controllers are very similar to computer applications. Their flexibility is not limited by the theory of the machine, but only by the physical capabilities of the microprogrammed memory and other

facilities — in the way the computers in 1955 were restricted by their memory sizes and capability of loading and holding other programs.

Therefore, it is worth considering some of the characteristics of microprogrammable memories to see what restrictions are being placed on us by their physical requirements.

To begin with, there are two major types of microprogrammable memories. One is the read-only type, which only has one set of programs and the other is the writable microprogram memories. A user can change the contents of some or all of the latter memory to use the new set of programs.

Writable control memory is becoming quite fashionable in major data processing equipment, being used extensively by the IBM 370 Series and then on new tape units and by various outside firms. I reported that Storage Technology uses writable memories in its tape controllers [CW, Nov. 17, 1971]. Their primary use is to allow STC to load in its own diagnostics that can work quite independently of the ones provided by IBM. That is a useful facility, but one which currently does not concern the user.

The equivalent IBM tape controller also uses writable microprogramming, but it has to be loaded at the factory, so that the user does not have the loading facilities available — and, from his point of view, gets an inflexible controller despite the technique used by the IBM engineers.

(IBM users of the Model 25 actually have a flexible system. It is now used to simulate the System 360. But here the user can load it with a new program on site. He therefore can alter it when he feels it is appropriate. So far, however, I have not heard of anyone doing so.)

Clearly, the capability of altering programs is also the capability of obtaining the most use

out of the microprogramming. So, in addition to the important areas that determine the usefulness of any particular set of microprogramming, as far as the user is concerned, there is the way in which new programs can be loaded.

Space Necessary

Another area is naturally the amount of space available. Many types of microprogrammable memories exist. Some are suitable for dividing into a number of different microprocessors. Others, as a result of the cost factor, have to be kept in a single uniform block. The cost of a few more registers, or some more control store, can be minor or may be major depending upon the physical characteristics of the memory (whether it is plated wire or capacitive, etc.)

But these are minor details, particularly since all the decisions on designing the memories so far have been made on the basis of small or no use of the systems.

In fact, in looking through the literature, it becomes clear there are many uses for the user, but he will have to learn to use them for himself. It may be of great user advantage to put IBM tape units on Honeywell equipment — and it may be absolutely proper from an engineering point of view, but it does not now seem likely that either the IBM or the Honeywell marketing forces are going to go out and sell the approach. It seems more likely that if users want it they will have to go and buy it.

Hopefully, the users will go out and get the learning, the loading facilities and the writable control stores. This would cause the next great computer revolution.

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The Taylor Report By Alan Taylor, CDP



September Is Proclaimed As Tape Quality Month

September will be tape quality month, as far as the Society of Certified Data Processors is concerned. Don Collins, chairman of the Technical Standards Committee, said his committee would thus put information into the hands of the profession — not only the raw data on tape qualities, but also instructive aids for use in installations to maintain the quality of tape, in-

characteristics and disk pack quality. The matter appears to be of particular interest in view of the problems encountered in using disk packs that have been tested only at one density, on drives that use higher different densities.

Double Density Disk Packs

In the case of the double-density 2314 style drive, while the packs are normally totally surface-tested disk by disk, when they are made up during the manufacturing process into whole packs, the testing is often applied only where the tracks are expected to be — the single density mode.

When the same pack is later used for double-density work without being retested for suitability, it may or may not work. Mechanically, there is no difference, but there is always the possibility of flaws emerging which had escaped the first thorough test during the manufacturing, or because they were not important for single density work.

The committee feels this problem of disk pack quality is similar to the problem of tape quality, where the failure of the tape drive manufacturers to provide any way for the user to test the real quality of the tapes on his own drives has encouraged the user to buy computer tape by price, rather than by quality.

Disk drives, the committee notes, are generally also designed in this way, and again the user is in no position to check out the true quality of his packs, or whether they match up to the specifications of the drive requirements.

Taylor Updates

formation about the problems involved, discussions of the advantages of having good tape and other relevant material.

"It will make up quite a package, and one which we do not think has ever been made available to users before," Collins said.

Brand Names Called For

The package will include responses to the Professional Opinion Survey [CW, March 1] run by the Committee on Tape Condition Data Usefulness. The survey respondents called for information on tapes to be provided by brand names, rather than by just brand A, B, C, D, etc. The readers said that providing anonymous descriptions would have less value to installations than brand name data would have. Exactly how much data can be provided this way is not now clear, but the first material will be included in the September package.

Also included in the package will be the results of work on the two most requested items in the recent survey: tape-wearing



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Whether or not you plan to exhibit at the SJCC, you should definitely plan to advertise your product or service in at least one of Computerworld's three special SJCC issues.

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A Computer Users' Forum, run by professionals and designed to bring regional users together in manageable groups to discuss mutual EDP problems with other users, and with regional and national experts . . . and a chance to study and evaluate new equipment and services that will be shown in the presentations of leading EDP suppliers comprising the Exposition.

The Format

Each Day 9:00-9:40 Keynote address by a nationally known expert — an independent, not a vendor — on the day's main subject. Sets the stage for discussions.

9:40-10:30 Panel discussion led by regional experts chosen for their progressive management principles. Questions encouraged.

10:40-11:45 Workshops — panel members conduct separate workshops. Your specific questions fielded, worked out.

12:15-1:30 Conference luncheon — keynote speaker summarizes chief points covered during panels and workshops.

1:00-7:30 Exhibits open, stay open 'til 7:30. Exhibitors will show the latest in hardware, software, services.

The Subjects

First Day: Data Entry

Keynote speaker; Lawrence Feidelman, President, Management Information Corp., Cherry Hill, N.J.; Editor, *Data Entry Today*.

Panels and workshops will be grouped by these four subjects:

- Keypunch replacement; key to tape, disc and cassette devices.
- OCR.
- Intelligent terminals — distributed processing.
- Direct data entry/source data automation.

Second Day: Data Communications: The Choices

Keynote speaker; Dr. Dixon Doll, Data Communications Consultant, faculty member, Graduate School of Business, Eastern Michigan University.

Panels and workshops will be grouped by these four subjects:

- Communications equipment from main-frame makers and common carriers.
- Communications equipment from independent suppliers.
- Data transmission via private (lines, microwave) networks.
- Data transmission via carriers (lines, microwave).

Third Day: Operational Efficiency

Keynote speaker; Charles Lecht, President, Advanced Computer Techniques, N.Y., N.Y., author of *The Management of Computer Programming Projects*.

Panels and workshops will be grouped by these four subjects:

- Core extensions.
- System/utility software modifications.
- Independent peripheral usage.
- Dedicated systems vs. general purpose computers.

Panel Members & Workshop Leaders

The regional experts who will run the panels and workshops have been chosen from a wide range of firms and institutions. Some will participate in more than one session, depending on their experience and expertise.

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- 07 DP Serv. Bureaus/Software/Plann.
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The Professional's Viewpoint

'Print Unprofessional Examples'

While the overwhelming majority of respondents to the Unprofessional Practices Survey [CW, Feb. 23] agreed that most of the suggested practices were, in fact, unprofessional, there were many brief opinions about how the committee should operate. One frequent suggestion was to collect and publish examples of unprofessional material so that people could learn to recognize them. Al Kocourek, chairman of the SCDP Unprofessional Practices Committee, has agreed to

The Professional Viewpoint Page is produced by the editors of *Computerworld* in cooperation with the Society of Certified Data Processors.

start such a collection with a view toward possible publication or other use. Examples can be sent to Al Kocourek via the Professional Viewpoint Page.

The questionnaire on this page is provided for more inclusive answers.

Other reader suggestions follow.

'Operate as Advisory Group'

I feel the committee should operate as an advisory group within the following framework:

- Committee members would be strictly volunteers.
- The committee would set up a definite code of ethics (perhaps adopt Alan Taylor's code).
- Encourage computer professionals within all organizations to seek out questionable, unethical or illegal practices. Report same to responsible parties, appropriate management and the committee.
- Where unprofessional practices are known to exist in a specific organization and its management is aware of the problems — but apparently makes no effort to solve them — the committee would use its prestige (as professionals) and power of the media to apply leverage to effect a solution.
- The committee would publicize potentially widespread unprofessional practices via widely distributed professional papers (*Computerworld* is a good candidate).
- Volunteers from other regions would act as local coordinators in solving regional problems. Perhaps local coordinators could act as impartial third parties in a many-faceted problem area between two or more organizations.
- The committee would be charged with the responsibility of correcting the "computer error" syndrome enhanced by the press and general public. Let us act professionally and admit we are responsible for a great many of the system problems that occur. Let us also publicize that we are trying to solve these problems.
- Encourage each organization to establish an ombudsman who would be responsible for investigating individual problems and, where necessary, take corrective action on behalf of the plaintiff. — Allan D. Walthers, San Jose, Calif.

'Serve as Information Point'

A great step has been made by getting this item before the profession for response. The committee's function should serve as an information point for both the user response and the professional's opinion. Both would be enlightened by further discussion of the topics in the survey, as well as some practical uses of proper practices within the industry. — L.C. Merich, Granada Hills, Calif.

Other Reader Comments

- "As an autonomous study group." — M.C. Ryan, Chicago, Ill.
- "Publish a manual of professional and unprofessional practices." — J. Hibbard, Minneapolis, Minn.
- "Interface with ACM ombudsman program." — P. Browne, Bloomington, Ill.
- "By taking the side of the person trying to communicate with people who operate

computer systems." — H. Eastham, Greenville, S.C.

"Publish audits of bad examples in *Computerworld*, i.e., The Taylor Reports on billing systems." — J. Burger, Melbourne, Fla.

"First, publish guidelines, then..." — D. Kelly, Garden Grove, Calif.

"Make its findings available to computer users." — D. Moore, Huntington, W. Va.

"As a watchdog and a formulator of guidelines." — R. Wilgus, Corpus Christi, Texas.

"Apply pressure to upgrade the training of professionals." — W. Cooper, Hillsborough, N.J.

"Determine unprofessional practices and set penalties as well as procedures for review." — H. Armstrong Jr., — Fayetteville, N.Y.

"By review/accreditation." — R. Henry, Minneapolis, Minn.

"It should be a study committee." — R. Bierbaum, Texas City, Texas.

What Should Unprofessional Practices Committee Do?

1. The committee should:

- | | |
|--|--|
| Collect examples | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Collect acceptable alternatives. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Publish examples. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Arrange for articles and talks to other societies. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Prepare lectures for EDP training courses. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Note failures. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Draw management attention to failures. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Draw public attention to continued failures. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Other | <input type="checkbox"/> Yes <input type="checkbox"/> No |

2. With which of these will you help? _____

(Continue any answers on separate page if necessary)

Name _____

Address _____

CDP? ☐ Yes ☐ No SCDP Member? ☐ Yes ☐ No Interested? ☐ Yes ☐ No

After completion, please forward to Al Kocourek, Chairman, Society of Certified Data Processors Committee on Unprofessional Practices, c/o Computerworld, 797 Washington St., Newton, Mass. 02160.

NEED TO KNOW ABOUT MICROGRAPHICS?

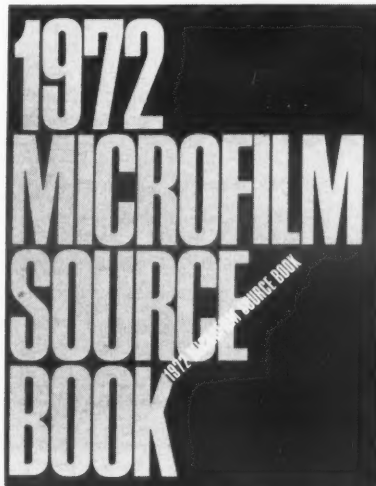
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PLUS many other useful editorial features such as a simplified, selected glossary of microfilm terms; a comprehensive listing of microfilm publishers and what they publish; a listing of microfilm associations and of associations interested in microfilm; a calendar of activities and meetings for 1972 and a review of the events of 1971; a roster of business publications which cover microfilm; a listing of the performance of public microfilm companies; and many more.

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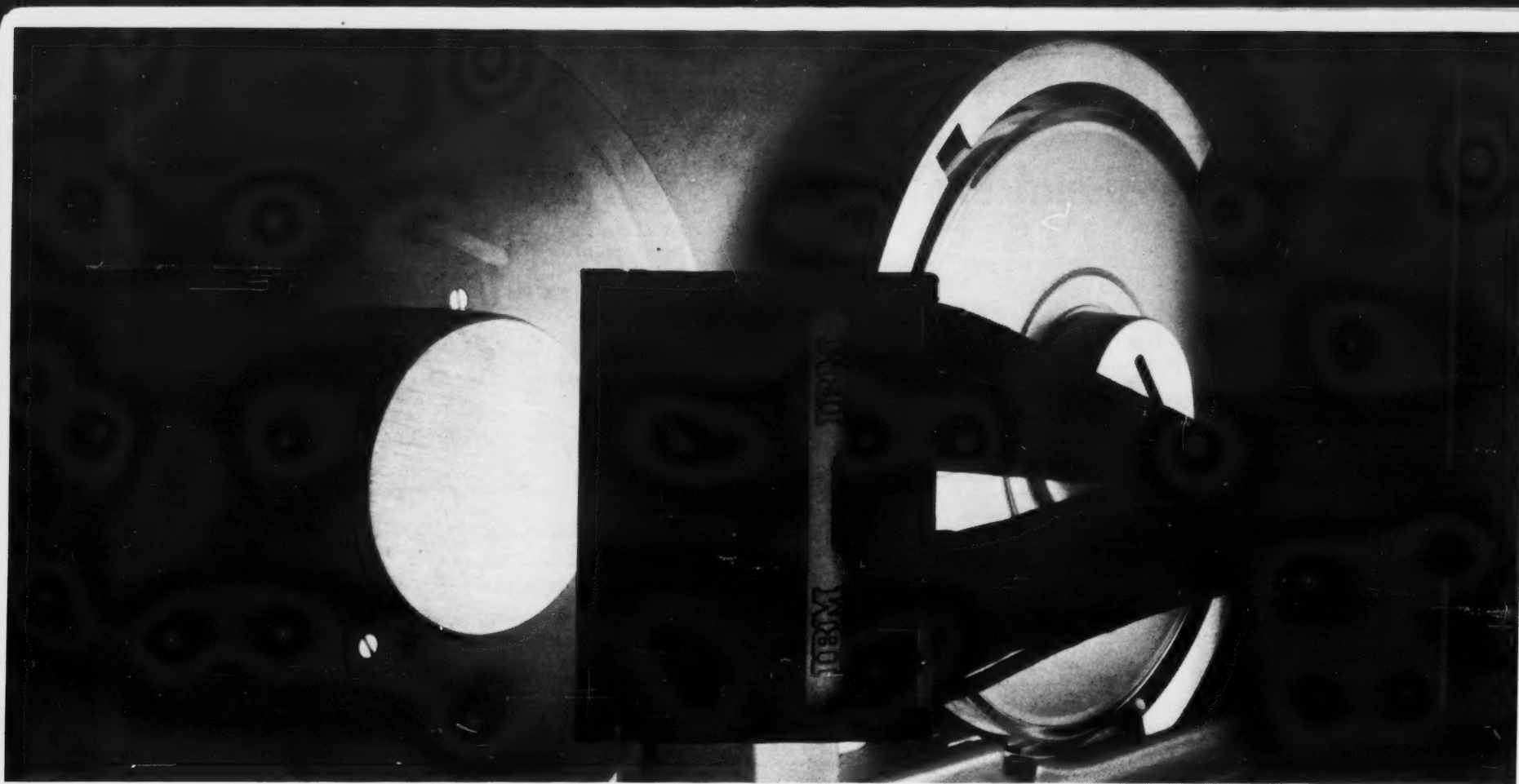
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For information about the new 1040 tape system, write California Computer Products, Inc.,

Dept. CW-M4-72, 2411 West La Palma Avenue, Anaheim, California 92801. Or call (714) 821-2011.



CALCOMP

Random Notes

Incoterm Adds Assembler For Use on SPD 10/20 CRT

NATICK, Mass. — Incoterm Corp. has announced an assembler which runs on the SPD 10/20 intelligent display, and translates symbolic source language instructions into machine-readable, machine-encoded instructions on a one-to-one basis. The two-pass assembler program will be available in June.

The assembler requires an SPD 10/20 display, a dual tape cassette and a P-165 printer, the company said from 6 Strathmore Road, 01760.

Ruler Speeds RPG Programming

NEW YORK — A 15-in. laminated ruler for RPG programming and debugging is available from Guidance International, a basic system user's group. The rule includes templates of all RPG programming specification sheets.

The programming aid also includes Ebcidic symbols in both hexadecimal and symbolic formats, printer positions in tenths of inches, line spacing in sixths and card volume measures. The ruler costs \$1.25 from P.O. Box 386, Murray Hill Station, 10001.

Honeywell Adds Order Processing

WALTHAM, Mass. — A software application system that provides computerization of sales orders for distributors has been introduced by Honeywell for use on its Series 200 and Series 2000 computer systems.

The new Sales Order Processing system generates customer credit checking, inventory-checking, invoicing, picking-document preparation and shipping instructions.

APL Offered on T/S PDP-10

PITTSBURGH — On-Line Systems, Inc. is offering its users a fully time-shared version of APL, said to be the first APL commercially available on DEC PDP-10 computers.

The company is at 4721 McKnight Road, 15237.

FDS Service Extended to Detroit

ST. LOUIS — The on-line servicing network of Financial Data Systems Inc. (FDS) has been extended beyond Missouri and Illinois with the addition of Metropolitan Federal Savings and Loan Association of Detroit.

FDS is using leased telephone lines to link its St. Louis data center to each of Metropolitan's 11 offices in the greater Detroit area.

FDS is at 6680 Chippewa Street, 63109.

Software Management

Users Urged to Study Total Picture

By Don Leavitt
Of the CW Staff

PHILADELPHIA — Users who must select, implement and then manage purchased or rented software should consider more than the capabilities of a package to realize the greatest savings, according to Joseph R. Rich of Monsanto-Enviro-Chem Systems Inc.

The user, in setting down goals, must look carefully at available programs, the program itself, the company that sells it and the interface and the resources of the user company, Rich told a meeting of the American Institute of Chemical Engineers.

A proper plan for installation, testing and implementation is essential, Rich said. Selling management on the program's merits, documenting its cost savings and using the program carefully once it is installed will bring the desired benefits, he added.

The motivation for installing any system is probably direct cost savings, but present and future labor savings, more flexible and more easily corrected applications must also be considered.

Various available programs should be studied, if at all possible, Rich said. Consider also whether the program design is modular so that modifying or expanding it won't mean a general rewrite. The user

must ask whether it is easy to learn to use the package, Rich added.

The vendors should be examined just as closely as their products. Potential users should determine whether benchmarks or demonstrations can be provided. If the program is in use, an interview of users may highlight strengths and weaknesses, Rich noted.

Examine Vendor

The vendor's ability to maintain and update the program and to service bugs

after installation should be determined before any package is acquired, he added.

Managers must be familiar with the level of education required of a package and know whether the skills exist among the planned users, again before acquisition, Rich said.

After reviewing the familiar "rules" of getting all affected departments involved, Rich suggested slow integration for any new program to provide time to identify problems and get used to the program.

Direct Access Feature Supports Data Bases Under SBC Call/370

NEW YORK — The availability of a direct access feature opens the way for large-scale data base operations on the Call/370 time-sharing service, according to the network vendor, The Service Bureau Corp. (SBC). Previously, subscribers could work only with sequential records, a spokesman noted.

Along with the new access feature, the network has extended its National Service, in which a user's multiple locations can all access the same data base, to more cities, and has increased the number of

cities that can support 30 char./sec terminals.

In providing direct access to files, SBC eases the work subscribers must do to update their records. Sorting of transactions, an absolute requirement for sequential processing, is unnecessary.

Collection of transactions, prior to sorting and posting against a sequential file, is also unnecessary and transactions and file inquiries can be handled as received, with the direct access feature, SBC noted.

The new feature can be used in either of two ways. Basic language program statements have been added to allow the experienced programmer to get at his files. Otherwise, the Mini-Mis Indexed Sequential Package (MMISP) has been added to allow high-level languages to Call the new access feature.

With the extension of National Service, a single data base is now available to users in 31 metropolitan areas. The 30 char./sec terminals are also available in 31 areas, but these are not all the same as the areas on the National Service, SBC noted.

Varian Offers 'Best' Monitor

IRVINE, Calif. — Users of Varian 620/L and 620/f minis can operate a variable number of routines concurrently within a priority system, under the Basic Executive Scheduler and Timekeeper (Best) real-time monitor system.

Best is described as an alternative to the Vortex real-time executive operating system, which requires the extended instruction set of the 620/f.

Varian also has an interactive Pert package and an RPG IV compiler, both of which operate under Varian's Master Operating System on any 620 Series machine.

Specific Runs

Scheduling with Best is based on time of day, and uses periodic interrupts from a real-time clock at intervals determined by the user's needs. Thus programs can be scheduled to run at a specific time, after a specific time interval, or at the next opportunity, the company said.

Best uses a series of "packets" of core resident routines, and a packet table, showing when each is to be used, is referenced each time a real-time interrupt occurs. The system can return both com-

pleted and interrupted routines to their proper places in the packet, updating the table appropriately.

The Pert package allows users to create, update and reschedule Pert networks via a terminal, and is particularly effective whenever complex problems have to be completed within specified times.

IBM Revises Licensing Agreement

WHITE PLAINS, N.Y. — IBM has begun to provide more and more of the services long associated with good independent vendors.

The licensing agreement for IBM program products and field-developed programs, for example, has been revised to provide more flexibility for customers in carrying out design, testing and installation activities.

The changes basically are:

- A pre-installation testing period of either one or two months.
- Shipment of unlicensed documentation when an order is received at IBM's

Program Information Department (PID).

• Shipment of licensed program documentation up to six months prior to shipment of the complete program, if the program is available for distribution from PID.

• Provision for the customer's retaining a back-up copy of a program for up to three months after the discontinuance date, when a follow-on version of the program with a different program number has been licensed.

The terms of the revised licensing agreement became effective on Jan. 20, 1972, a company spokesman said.

"I almost bought the wrong Job Accounting System..."

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A few weeks ago, Value Computing announced, in *Computerworld*, the availability of Comput-A-Charge, an automatic system for billing IBM DOS/OS computer users which solves the multi-programming billing problem.

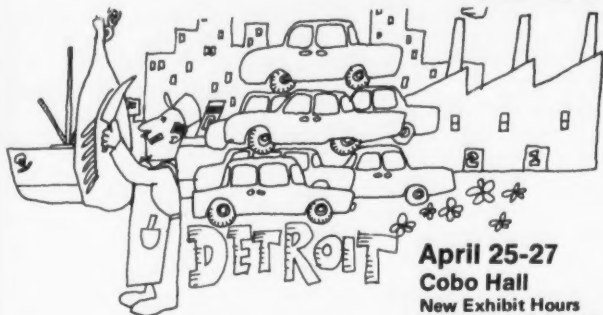
The response has been extremely enthusiastic. From one of the first customers:

"I almost bought the wrong job accounting system. In my attempt to save my company time and money, I was about to choose an over-priced inadequate system. Comput-A-Charge stopped me from going down a blind alley. With Comput-A-Charge, I can go into other systems, like scheduling and tape control."

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'Profile' Uses Monte Carlo Methods To Do Risk Analysis on Decsystem-10

CAMBRIDGE, Mass. — Report generation and Monte Carlo simulation methods to do risk analysis have been combined for Decsystem-10 users, in the Profile probabilistic forecasting language, from Core & Code Inc. Profile is said to be suited to situations involving summarizing or tabulating information at the end of fixed time periods.

Operating interactively on the Decsystem-10 time-sharing system, Profile lets the user build and execute a Monte Carlo simulation model without worrying about setting up the complex routines and systems to perform the analysis, the company said.

Set of 'Rules'

With Profile, designed for both technical and non-technical personnel, the user enters the logic of his application in a set of "rules" relating input data to the output reports.

The rules use all the features of DEC's Fortran, and may call in other subroutines for additional calculations or tabulations. Memory requirements are dynamically allocated to fit the size of the

user's problem, a spokesman said.

Interrelated Modules

Profile is built around three interrelated modules. One is a report file builder and editor through which the user specifies the detailed format of his output. Editing can include any number of decimal places, zero suppression, dollar signs and percentages.

Prodep, the data file builder and editor, lets the user build a data base for analysis by specifying the variable number, type and description.

An executive program, the third module, allows the user to run an analysis, and to print output reports to the teletypewriter terminal or to a disk file. It also provides sensitivity analyses, the retrieval of selected report and data files for analysis, and the execution of new Profile models.

Profile costs \$12,000 plus installation, in which case source code is provided. Rental plans are also available, Core & Code said from 26 Grozier Road, 02138.

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Accounts Receivable Uses Cobol or RPG

WALTHAM, Mass. — An accounts receivable system from McCormack Dodge Corp. handles either open-item, balance forward or both types of accounts, and is available in Cobol for full-sized CPUs, or in RPG for the IBM 360/20 or the IBM System 3.

The modular system calculates service charges and enters them against accounts, and can provide detailed credit analyses with special notation of situations requiring attention, the company said.

Management Reports

Management reports can be provided by division, group, domestic or foreign trade, or any other desired breakdown. Report content is variable to allow isolation of pertinent information.

The Cobol version of the package, to run in 32K under either DOS or OS/360, requires 16K on a 360/20. The Cobol version costs \$995, while the RPG version is priced at \$595, from 1380 Rear Main St., 02154.

S/3 Package Offers Six Applications

MINNEAPOLIS — Programs for six basic accounting applications are now available for IBM System 3 Model 6 users, from Certified Software Products. The programs, which can be integrated, include systems for order entry, inventory control, accounts payable, accounts receivable, payroll and general ledger-financial statement preparation.

Certified has previously had similar systems for the 3/10, and the latest packages include much the same processing logic. The entry coding on each had to be rewritten, however, because of the limited input capabilities on the Model 6, the company noted.

Entries through the Model 6 keyboard can be edited field-by-field requiring correction before anything else can be entered, or they can be stored on a disk until all entries are in. At that time, the system edits the entire file and prints out, and bypasses, these unacceptable records.

Each application is modular so that user requirements can be accommodated easily. There are, in fact, several variations of each system, each oriented to the needs of particular industries, a spokesman said.

The systems are written in RPG II and are operational in Model 6s with at least 8K bytes of core. Individual modules within each system may range from \$800 to \$3,000, he added.

Certified is at 2419 Nicollet Ave.

IDCMA Hits PBX Interconnection Plans

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. — Present "interim measures" proposed for the interconnection of customer-provided PBX equipment "would preclude the use of data modems," the FCC has been told.

The charge was made in a letter

Communications

from the Independent Data Communications Manufacturers' Association (IDCMA) to the FCC Commissioner Robert E. Lee. The letter said standards now being considered by the PBX study committee have ignored the important requirements of data transmission.

"Only for Voice"

The IDCMA letter said the pro-

posed Bell CDH coupler is designed only for voice. "Interface standards should provide the greatest possible benefits to users," IDCMA said, and it called on the FCC to "include a data transmission capability as a mandatory requirement" for the interconnection of customer-provided PBX equipment.

In a related statement, the IDCMA took issue with AT&T's William Quirk [CW, March 15] who said current PBX interconnection studies would probably

set a pattern for data equipment. The proposed PBX committee standards "would be unnecessarily complex, restrictive and inappropriate for data modems," according to Arthur Carr, IDCMA vice-president.

"We agree [with Quirk] that the present Bell-type DAAs should be done away with," Carr said. "More logical and realistic approaches to the interconnection of data modems are needed," the IDCMA officer said.

Modules Aid Telecommunications

NEW YORK — Software packages offering standardized, modular programs for minicomputer-based telecommunications systems are available from Inco-
tel, Ltd.

There are module versions for DEC PDP/11-20 and Honeywell H316, 16-bit minis. A version

for the Data General Nova family is being developed, the company said. Versions for other computers can be specially ordered, Inco-
tel added.

The modules can be combined to perform information retrieval, inquiry/response, line switching, message switching, network control and order entry.

Program modules are provided on paper tape and the system requires a minimum of 16K, 16-bit word drum storage. Inco-
tel said a standard message-switching software system would cost between \$50,000 and \$60,000. Delivery of standard modules is immediate from 1212 Avenue of the Americas, 10036.

Devices May Reduce Dial-Up Costs

IRVING, Texas — A two-directional signaling device from Diversified Systems Inc. can help reduce dial-up communications costs. The Data Sig 100 allows a data user at one location to signal another site when errors or equipment problems occur.

The unit is "plug compatible" with most data equipment and is connected between the modem and the terminal or computer system, the company said. When a transmission problem occurs, a user at either end of the data line can go from data to voice mode by pushing a button on the Data Sig 100. This initiates a beeping sound and a flashing light alerting the operator at the other end of the line.

When the user normally has to redial a connection to get an

operator, the unit can save up to 50% of phone line charges, a spokesman said. The Data Sig 100 costs \$500 and is available on a 60-day delivery. Diversified Systems Inc. can be reached through Box 998, 75060.

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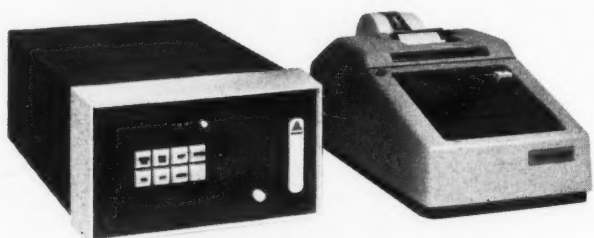
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A New Approach to Reporting: "Creativity"

MIAMI, Florida. — You get a list of all \$100,000 and over sales accounts, only to find out that you need the year to date figures as well. So you add them to the report and re-run it. A lot of time; a lot of paper.

As of today, there's an information retrieval and reporting system that lets you create precisely what you want. SELECT-I is its name (it's the brainchild of Selected Utilities, Inc. of Miami, Florida), and it's designed to manipulate statistical data into a variety of report structures.

The utilization of SELECT-I transcends virtually every facet of business or industrial organization. In the computer room, SELECT-I can perform any number of utility functions in addition to comprehensive data file queries and selective reports for day to day business decisions.

SELECT-I allows records to be selected from a file on the

basis of certain present data values within the file. Selected records may be copied to another file (reblocked, if desired) and/or printed as record images or as complete reports containing titles, heading, field

editing, accumulations and control breaks. Many other user options are easily performed upon the selected data.

Truly, in any situation, at any level, SELECT-I is the "creative" reporter.

SELECT-I: Resolves Most Complex Applications in 20 Minutes or Less

No matter what point you desire, SELECT-I can and will, in the shortest time, produce the demanded output. The most complex applications can be resolved in 20 minutes or less. The learning curve to fully utilize SELECT-I ranges from just one to four hours.

SELECT-I can be installed in less than three minutes on your equipment (360, 32K and up, Spectra-70 and Univac 9300).

On site training can be completed in half a day.

SELECT-I is, in a data-oriented system, the most economical and fastest system yet devised. Additionally, SELECT-I provides a unique cross reference index for problem solving—simply identify the type problem and then look it up in the diagnostic index for the solution.

Florida Companies Speak Out on Select-I

Initial installations of SELECT-I have been in the "home base" area of Miami and vicinity. Results have been overwhelming.

"We wish to commend you (Selected Utilities) not only on the creativity involved in your program, but also on the ease in which we can use SELECT-I..." says Automatic Data Processing of Florida, Inc.

"...more important than the considerable money savings is our ability to react immediately to most management reporting requests..." reports The Wackenhut Corporation.

"...We have found the time savings in our programming staff far exceeds the monthly lease price..." says American Bankers Life Assurance Company.

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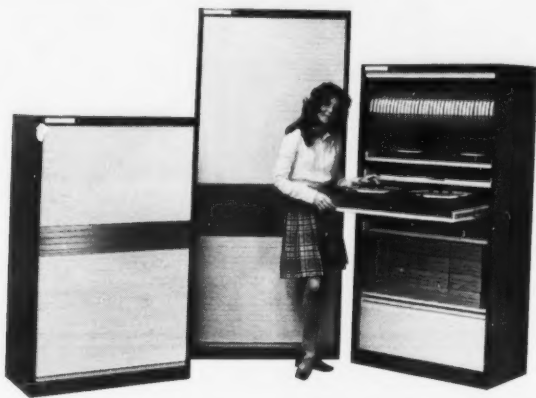
Because Selected Utilities, Inc. is so certain as to the desirability of SELECT-I, they will arrange—at your convenience—an installation for a month's trial FREE OF CHARGE. Call (305) 865-0132 or write Selected Utilities, Inc., 500—92 Street, Surfside, Florida 33154. You can't possibly believe all that SELECT-I has to offer until you see it for yourself.

SELECT-I. The creative reporter.

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Two years ago we decided that it didn't make much sense to keep designing cabinets that were locked-in to the storage of cards only or tape only or one type of disk pack. So we studied the total media storage problem from all angles and came up with what we believe is the ideal solution, optimedia™ coordinated cabinets can store all types and sizes



of data processing media. They can store them in virtually any combination you desire, and — when your storage requirements change, optimedia cabinets can adapt to the changes. They're sort of a "living" storage system that won't become obsolete or leave you with excess capacity for one medium and not enough for another.

optimedia™ coordinated cabinets have other benefits such as "Action Level" storage that lets you place all media at the most convenient retrieval height, smooth operating roll up doors that open all the way leaving the entire inside fully accessible, and up to 20% extra storage capacity when compared to other cabinets with the same outside dimensions.

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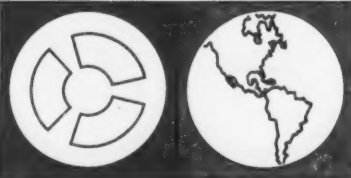
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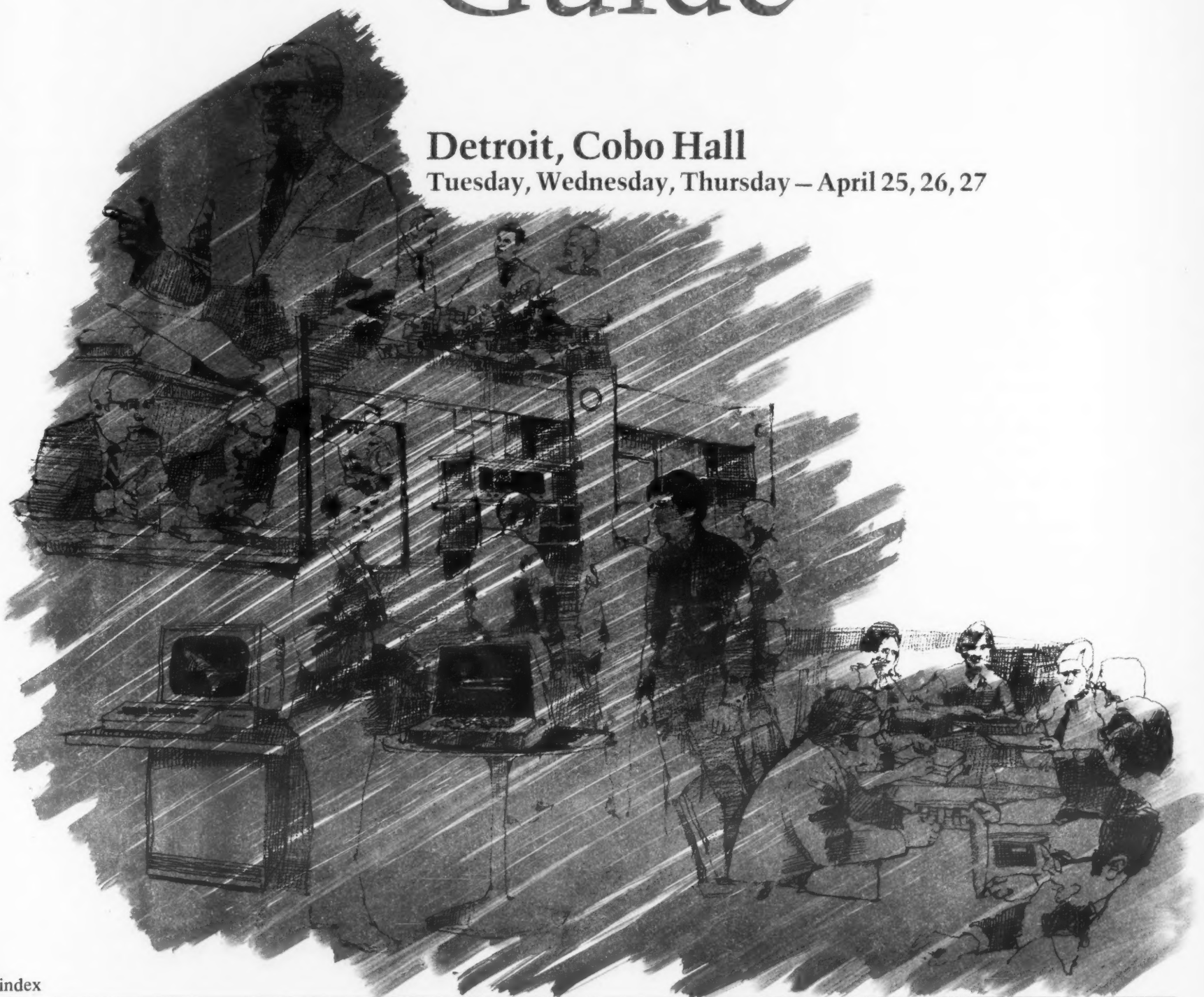


Regional Supplement
to *Computerworld*
April 19, 1972

GREAT LAKES Computer Users' Forum & Exposition Guide

Detroit, Cobo Hall

Tuesday, Wednesday, Thursday — April 25, 26, 27



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Chance for Betterment

Computer Users Visited by 'Total Conference'

By Edward J. Bride
Forum Coordinator

The total conference for computer users is here!

This first Computer Users' Forum and Exposition has brought together the efforts of EDP managers and practicing professionals to help each other find answers to the problems of the day.

Throughout the exhibit hall and during the forum, the latest technical and management ideas will be probed by experienced users trying to improve the efficiency of their individual operations.

Each morning, a national keynote speaker will review the state-of-the-art, and call users to action in one particular area. The speaker sets the stage for the panel discussion and ensuing workshops.

A dozen management-level users in each city will participate in the panel discussions, four each day. Each day is devoted to a single topic: data entry, communications, and operational efficiency. Each panelist then conducts a workshop, with technical assistance from his own computer installation where appropriate.

The keynote speaker then returns during the luncheon, and summarizes the progress made and knowledge attained by the attendees. After lunch the exhibit hall opens.

Users viewing the equipment exhibits will have a special opportunity to have direct contact with sales representatives and technical experts, without the "emergency" atmosphere that often pervades conversations in the computer room.

In the exhibit hall, users can leisurely "shop" from vendor to vendor, learning of new concepts and equipment — without the pressure of a sales meeting.

Exhibitors know that the effectiveness of most national computer conferences and exhibitions has decreased over the past few years, partly because users are hard-pressed to find travel funds or take time

off to go to conventions. For the exhibitor, the costs are often huge, and the results miniscule. Engineers come to talk to each other and evaluate the competition, all-too-often ignoring the user.

But exhibitors also know that the "payoff end in the computer industry" is the end user, says Patrick J. McGovern, *Computerworld* publisher. He is "neglected and lost in the shuffle" in many larger shows, McGovern believes. While there are some regional, specialized shows, they are bothersome for both user and vendor, and are often too expensive.

The answer, of course, is a traveling show: a Computer Users' Forum and Exposition that brings the computer industry to the user. Our "caravan" will travel to nine cities with a trio of nationally-prominent speakers, a forum organizer, and, of course, the exhibits. We will present to computer users the complete range of alternatives — in equipment, software, and services — needed to solve their information processing requirements.

Hardware, Software

If you think hardware topics dominate our panels and workshops, remember that software problems will be discussed throughout our three-day forum, not just the last day when system software is a specific topic for the "operational efficiency" panel.

Actually, the use of system software modifications and enhancements, and the implementation of commercial or in-house utility routines is just one way a user can control and improve his operational efficiency. The topics on the other two days are both aimed at the common goal on enabling users to improve their operations.

There are software aspects to data entry, particularly with the use of intelligent terminals or with direct data entry. Users with software solutions... and problems... should

plan on attending that half-day session, from the keynote speech and panel discussion, through the workshop conducted by a user most closely-aligned with the attendee's installation.

The same guiding principle can be applied to the data communications session. There may be special software considerations before "throwing out" a carrier's data communications equipment, or the gear made by a user's mainframe maker, in favor of an independent communications supplier. The user with this type of a question can best find the answer in the workshop conducted by the panelist who has used the same type of source for communications equipment.

Likewise, with the transmission

topic. There are applications which are suited to leased-line data transmission more than dial-up usage. Whether the availability of a line, its quality, or the speed of data transmission is the criterion, users can find their hardware, software, or management problems discussed more fully, and can participate more actively, by attending sessions with their "counterparts" from other using organizations.

One of the more exciting panels should be on the last day, when users talk of hardware and software considerations involved in being "innovative." The international background of the speakers and the diversity of subjects will make the final day an especially rewarding experience for attendees.

Speech Synopses Indicate Users Study Top DP Issues

Day One: Data Entry

Lawrence Feidelman says data entry is a system, but many users are presently using first generation data entry techniques for third — or even fourth — generation computer systems.

In his opening day keynote address, he says data entry must be considered as a system because it involves much more than equipment selection. There are personnel considerations, data preparation procedures, forms design, equipment, communications, and computer interface. Data entry, then, must be considered from the point at which data is generated, the source, until it is input into the computer in machine encoded form.

Mr. Feidelman is President of Management Information Corp., Cherry Hill, New Jersey. He recently edited one of the most authoritative books on his assigned topic:

Data Entry Today.

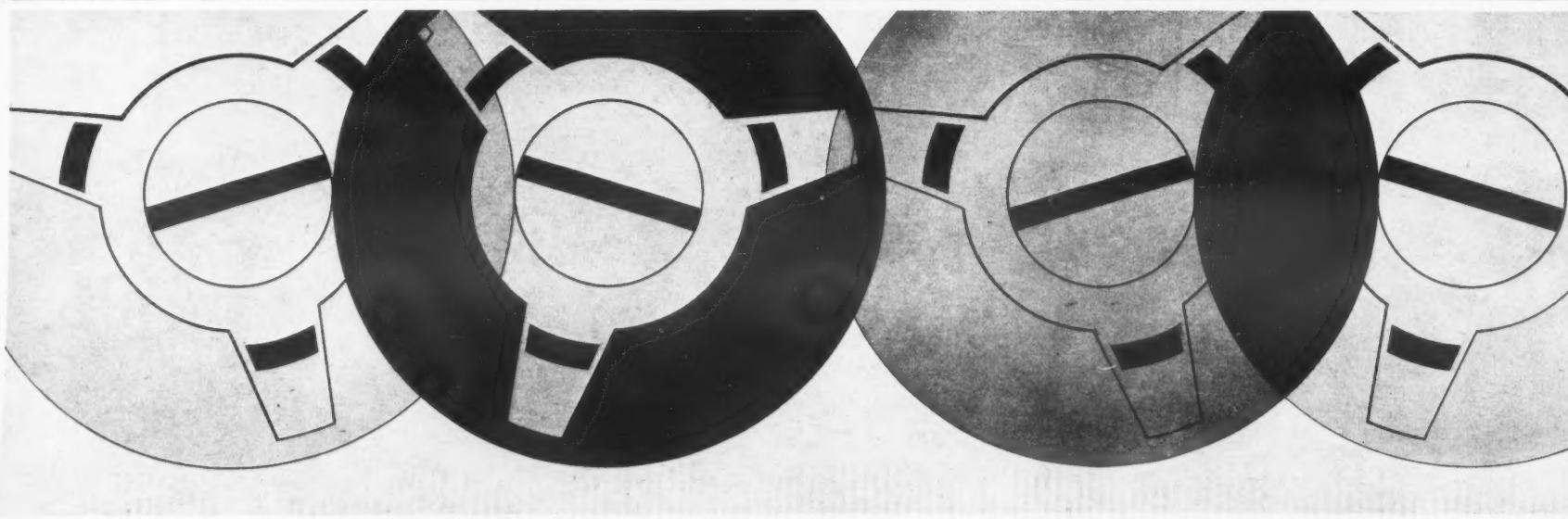
From a systems viewpoint, the keypunch provides a very slow means for data entry, he says. The rigid format is costly, especially when used in multi-keypunch installations, he notes. The keypunch is kept alive by users: ingrained usage of the unit-record concept, ease of data insertion, and personal psychological (resistance to change) reasons are cited in his speech.

There are four variations to keypunch replacement: the stand alone unit, central collection, shared processor, and optical character recognition. The data entry panel separates these topics a little differently, but the concepts will all be discussed, during the speeches, panels, and/or workshops.

Revolutionary Approach

Source Data Automation represents a more revolutionary approach, he noted, with the object

(Continued on Page S/4)



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Keynote Speech Summaries

(Continued from Page S/2) being to capture data at the source or point of generation, eliminating all unnecessary re-transcriptions. The man/machine interface therefore becomes "the critical factor" he notes, whether this involves key entry or automatic readers. There are some defineable factors which hold users back, keeping them away from progress in what is often described as a continuing "bottleneck area."

The apparent stagnant

state of data entry in some users' sites stems from lack of full understanding of new techniques, a resistance to change, a failure of salesmen to emphasize systems concept (rather than just a new piece of equipment), and other factors such as business conditions. The role of data entry technology in the 70s is just one volatile topic of this speech.

The trends of the 70s, including predictions on the use of OCR and point-of-sale terminals, comprise the

last few minutes of this delivery, providing the transition to our panel discussion. The panel discussion begins immediately after the speech, so as to avoid a phenomenon akin to the title of the speech itself: "The Generation Gap Between Data Entry and Data Processing."

Day Two: Data Communications

Dr. Dixon Doll says that one of the major problems for communications-oriented computer users is uncertainty in the regulatory environment, especially re-

garding interconnect and competition among the carriers.

As the second-day keynote speaker in the forum, he lists other problems as both man-caused and technically-abetted. The non-integrated treatment of computer, data processing, and data communications by users and carriers can create problems for communications users, as can the same lack of consistency in solving voice and data communications difficulties.

There is no "full spectrum of alternatives" from car-

riers, he states in his speech, indicating that users may have to change carriers just to take advantage of different solutions to the same problem. The unreliable nature of some existing carrier facilities is a problem to everyday telephone users, but is a special business difficulty for computer users.

In his survey of the current computer communications scene, Dr. Doll, a consultant and Eastern Michigan University educator, discusses common carriers, computer vendors, independent suppliers of equipment, specialized (microwave) carriers, regulatory climate and — especially — users.

In summarizing the types of user networks and typical application requirements, he evaluates distributed/centralized networks, urgency of transactions, user requirements in response time, geographical distribution of terminals, and privately-owned/carrier provided links.

"Building Blocks"

Part of every communications system is the equipment, so part of the communications keynote speech is a description of the building blocks used to obtain cost-effective systems. As communications specialists realize — but managers often do not — these building blocks include terminals and modems, multiplexors and concentrators, front end processors, special software, data links, error control devices and techniques, and diagnostics.

With special emphasis on managers, Dr. Doll discusses design alternatives, and the importance of open-mindedness when evaluating the choices. Coping with vested interests of equipment vendors and carriers will be one stumbling block to effective choices, he relates.

Dr. Doll concludes his speech with some hard-headed predictions of what to expect in the area of interconnect rules (will they really be relaxed?), the changes in AT&T's tariff approach, a potentially increased spectrum of service offerings, the centralization of application processing, distribution of communication control functions, and message switching systems.

Enhanced cost control and improved efficiency will be the focal point of the computer-controlled line and

(Continued on Page S/5)

THE WORLD'S FIRST GIRL MINICOMPUTER. SUE.

Here is SUE. The Systems User Engineered minicomputer. We have big plans for SUE. She's going to break the hearts of competitive minicomputer sales types.

She's flexible, responsive, adaptable and nearly ageless. SUE has micro-modularity. All modules...processor cards, memory cards, device controller cards, or whatever...simply attach to the Infibus of a 24-card frame. SUE can meet your systems needs exactly. You never pay for more than you want or have to take less than you need. If your system requirements change, so does SUE. For example, a switch from core memory

to semiconductor memory, or a mix of both, requires only a card change. Now that's flexibility. And responsiveness.

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The price is equally exciting. A complete 4 K computer for only \$4,295, dropping to less than \$2,600 a unit for 100. That's neither the least nor most expensive version of SUE.

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Lockheed Electronics
Data Products Division, A Subsidiary
of Lockheed Aircraft Corporation



(Continued from Page S/4)
message-switching portion
of the speech.

Day Three:

Operational Efficiency

Charles Lecht, president of Advanced Computer Techniques Corp., New York, says very little work has been done to provide users with a "unified theory" of increasing systems throughput. Lecht is the keynote speaker on the third day of the conference, and his Operational Efficiency speech is entitled "Throughput Revisited."

In his speech, he maintains that the environmental mix of hardware, software, people, and business procedures has been a bit much to cope with, when considered a topic for a throughput study. Indeed, the promise of throughput theory becomes increasingly remote as hardware, software, and personnel environments become increasingly sophisticated, he says.

After looking at the state of the art today, particularly from a user's viewpoint, Lecht asks some pointed questions of his audiences, one which may provide stimulated discussion: Is it true that systems being supplied to the user today justly deserve representation as being advanced, highly sophisticated and very powerful if these same systems have served to decay throughput predictability?

He suggests our admiration for today's engineering sophistication of computer systems has masked the fact that, as this sophistication has increased, it carried along in its genes even more sophisticated growth stages of "the seed of throughput unpredictability" initially sown by engineers "whose technological preoccupations far exceeded" their interest in the end use of their inventions... the "why" and "what for."

"Apologize"

Could it be that we owe an apology to these engineers, because we just haven't really worked hard enough to solve the problems of throughput predictability?

In addressing this possibility, Lecht said users must

consider hardware, software, personnel, and procedural sub-environments, as well as the symbiotic unions.

With a flair for public speaking, which is familiar to many computer society members, Lecht reminds users that coexisting with our quest for operational efficiencies and throughput predictabilities must be our dedication to the principle that "human engineering" is preferable to the "engineering of humans."

DAILY SCHEDULE

8:00 a.m.: Registration
9:00 a.m.: Welcome, keynote address
9:40 a.m.: Panel discussions, general questions
10:40 a.m.: Workshops, specific questions
12:15 p.m.: Lunch
1:00 p.m. - 7:30 p.m.: Exhibits open

The Computer Users' Forum and Exposition will follow the same schedule in each of the nine cities.

TOPICS

First Day: Data Entry (keypunch replacement, OCR, intelligent terminals, direct data entry).

Second Day: Communications (equipment sources: mainframe makers, carriers, independent suppliers; transmission: private, carrier nets).

Third Day: Operational Efficiency (core extensions, software, independent peripherals, dedicated vs. general purpose systems).

Need a remedy for data communication headaches?



Try our permanent cure.

If keeping your data communication system on line is becoming a headache, don't live with it. ICC can cure it. Permanently.

The ICC cure starts with tested, field-proven modems that operate reliably where ordinary data sets have problems. Then we offer professional installation, training of your personnel, prompt field service, and continuing support to keep your system operating.

With ICC, you won't just lose a headache. You'll gain new confidence in your data communication.

Send for a copy of our product catalog.

ICC

International Communications Corporation

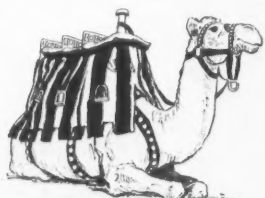
7620 N.W. 36th Avenue, Miami, Florida 33147

Telephone 305 - 691-1220

In Europe: RACAL-MILGO LIMITED Reading, Berks, England

a milgo company

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CW Forum and Exposition

People Meeting People...



Panelists describe their own operations before answering questions from forum participants.



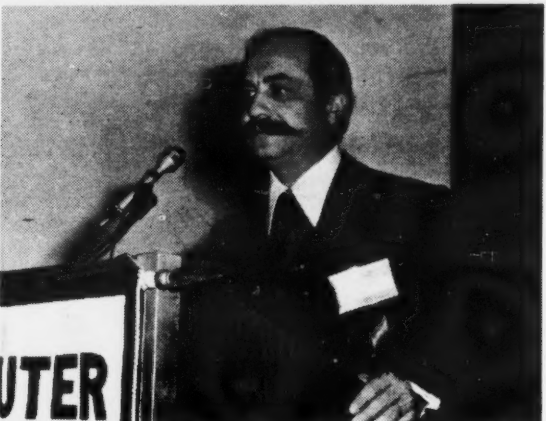
Panelist Robert Chernis of Lumber Mutual Fire Insurance leads a workshop on intelligent terminals.



Lawrence Feidelman discusses data entry.



Dixon Doll answers questions on data communications.



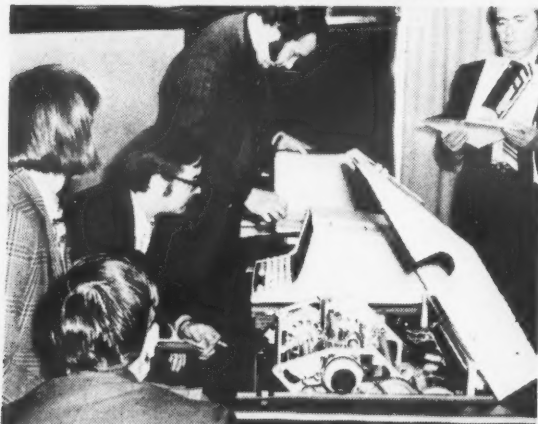
Charles Lecht makes a point on operational efficiency.

Homework Vital to Good Data Entry

...And the Machines



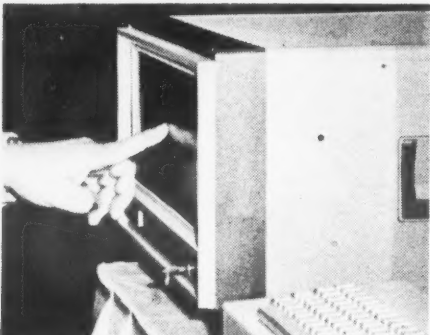
Graham Magnetics illustrates Epoch-4 tape toughness and graphs the stress strain curve on samples.



Computer Terminal Corp. exhibitors meet some users who "want to see the works."



Cartridge disks are loaded into Iomec's Iodisc Series One data storage system.



No buttons, no switches are visible on the Lockheed Sue Minicomputer. Microflex switches and light-emitting diodes are hidden behind the flexible plastic front panel.



Users try out Interdata's Series 70 processor.



Calcomp demonstrates its new 1040 magnetic tape system that is plug-to-plug compatible for the 360/370 CPUs.



CW Photo Feature
By V.J. Farmer



COMPUTER USERS' FORUM AND EXPOSITION

Panel and Workshop Topics

DATA ENTRY*First Day*

Keypunch Replacement.

OCR.

Intelligent Terminals.

Direct Data Entry.

DATA COMMUNICATIONS*Second Day*Data Communications Equipment Sources
(mainframe makers and/or common carriers).Data Communications Equipment Sources
(independent suppliers).

Data Transmission by Private (leased line) Networks.

Data Transmission by carrier (dial-up) networks.

OPERATIONAL EFFICIENCY*Third Day*

Core Extensions.

System/utility Software Modifications and Enhancements.

Independent Peripherals.

Dedicated systems vs. General Purpose Computers.

The regional forums and workshops will be headed by local experts in the fields covered. A listing of leaders and panelists will be available at the Registration Desk.

COMPUTER CARAVAN STAFF

President Patrick J. McGovern
 General Manager H.G. "Charlie" Asmus
 Technical Direction Dick Bautz
 Forum Direction Robert M. Patterson
 Forum Coordination Edward J. Bride
 Exhibits Neal Wilder, Dottie Travis
 Attendance Coordination W. Walter Boyd

Societies Helped, Now Gain from DP Forum

Several professional computer societies have contributed to the success of the forum by suggesting innovative users to serve as panelists and by publishing our schedules and formats in member newsletters.

Some of these societies will be exhibiting member publications in the lobby, along with "recruiting" materials. While not all societies have chapters in all cities, and while it was not possible to contact every individual chapter of every organization, the availability of these facilities was published in *Computerworld*, and was extended to societies on inquiry.

Local chapters in some cities may hold special, regular, or even "organizational" meetings in rooms provided at no expense to them. Those which have indicated an in-

terest in these facilities, in at least some of the nine cities, are as follows:

Association for Computing Machinery

Association of Computer Programmers and Analysts

Association for Systems Management

Data Processing Management Association

Society of Certified Data Processors

Local participation, when made known to forum officials sufficiently early, is being posted in appropriate entrance areas. If there is a question about the use of facilities or plans for meetings, check with your group's information table in the lobby, or call your local/regional representative.

Your presence at this forum and exposition attests to the interest of the computer community in participating in a meeting with a format tailored for you — the end user. We trust that you will find the experience a valuable one, and that our program meets your expectations.

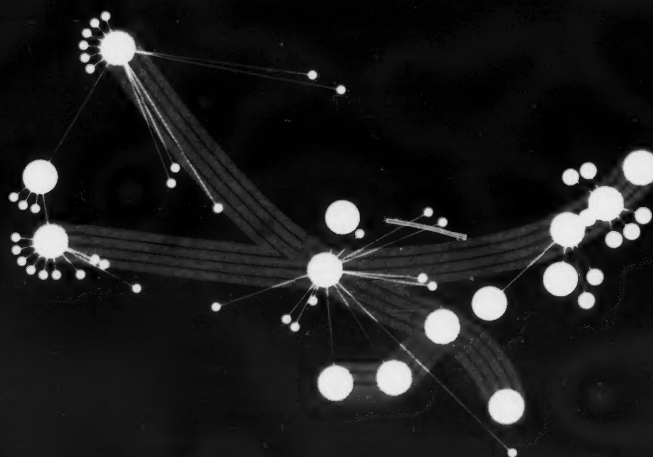
The exhibiting family welcomes the opportunity to talk with you about your problems, and explore their solutions with you. The personnel staffing the exhibits are local people who, in turn, can continue a dialogue with you after the "caravan" departs. We feel that this element of our program should be of continuing benefit to all.

Several of our exhibitors have organized more detailed presentations of their problem solutions, and a schedule of their special meetings is posted in the Registration Lobby and on the exposition floor. We urge you to take advantage of their programs.

We welcome your comments on those aspects of the Computer Users' Forum and Exposition which you find beneficial, and also what you might like to see modified or improved in future events of this nature.

The staff and committees have worked long but enjoyable hours, organizing and bringing this conference to you, and we hope you share with us the satisfaction in having filled a long-time void in convention planning: a limited but hard-hitting technical program on current user topics, combined with a relevant exhibition . . . all brought directly to you, the computer user.

H.G. Asmus
General Manager

MAY WE DOT YOU?

We've got dots in New Jersey, California, Texas, Kansas, Louisiana, Massachusetts. Dots for Seattle, Chicago, Dallas, Detroit.

Wherever you are, whenever you need computer services, the BCS dot nearest you will put you in touch with our comprehensive service network. When the eleventh hour arrives, we'll be there. (On the dot.)

BCS

BULL AND COMPUTER SERVICES, INC.

CORPORATE OFFICES EAST (201) 361-2121, WEST (206) 773-6161

The following is a listing of Computer Caravan exhibitors, as of press time. Consult the Addendum Sheet for additions.

APPLIED DATA RESEARCH, INC.

Route 206 Center
Princeton, N.J. 08540
Tel: (609) 921-8550
Booth No.212

ADR's 6 proprietary software packages provide both management and programmers with unique programming aids which increase the effectiveness and efficiency of data processing installations. These packages are: 1) MetaCOBOL, a COBOL Pre-processor for COBOL conversion, COBOL program preparation, testing, monitoring and evaluation, 2) AUTOFLOW, a patented debugging and documentation system, 3) The LIBRARIAN, a source program maintenance and retrieval system, 4) ROSCOE, a conversational on-line program test system and remote job entry system, 5) SAM, a software and hardware simulator, 6) PI SORT, a DOS plug-compatible sort that is faster than IBM's 450 and 483 sorts.

BOEING COMPUTER SERVICES, INC.

P.O. Box 708
Dover, N.J. 07801
Tel: (201) 361-2121
Booth No.208

Boeing Computer Services, Inc., offers computing time programming, consulting, training, data base services and other computer oriented services.

BCS, a subsidiary of The Boeing Company, operates throughout the United States and maintains data centers in Philadelphia, Wichita, Huntsville, and Seattle.

On-line demonstrations of widely accepted applications: general business, financial, or management systems... manufacturing, engineering, or scientific techniques... inventory management... computer operating systems. Visit with BCS. Personal attention now — and later.

CALIFORNIA COMPUTER PRODUCTS, INC.

2411 West La Palma Avenue
Anaheim, CA. 92801
Tel: (714) 821-2731
Booth No.'s.301-303

GRAPHIC OUTPUT SYSTEM-900/1136

A complete, high-performance off-line plotting system; the CalComp Graphic Output System — 900/1136 is composed of a Model 900 Controller, a Model 937 Magnetic Tape Unit and a Model 1136 Digital Incremental Plotter.

1040 MAGNETIC TAPE SYSTEM

An ultra-high performance magnet-

ic tape system, the CalComp 1040 System has been designed for plug-to-plug compatible use with all System 360 and System 370 tape drive systems. The 1040 System is made up of a Model 1040 Controller and up to eight Model 345 and 347 Magnetic Tape Units.

1015A DUAL DENSITY DISK STORAGE SYSTEM

The CalComp 1015A System is a high capacity direct access storage system which interfaces directly to the selector channel of System 360/30 (and higher) and System 370 computers. The 1015A is a direct replacement for the IBM 2314B and features storage at a far lower cost per bit and with less storage space.

CENTRONICS DATA COMPUTER CORPORATION

One Wall Street
Hudson, NH 03051
Tel: (603) 883-0111
Booth No.206

Model 101 and 101A Printer, and Model 401 CRT.

COMPUTER TERMINAL CORPORATION

9725 Datapoint Drive
San Antonio, Texas 78229
Tel: (512) 696-4520
Booth No.109

The Datapoint 2200, a computer

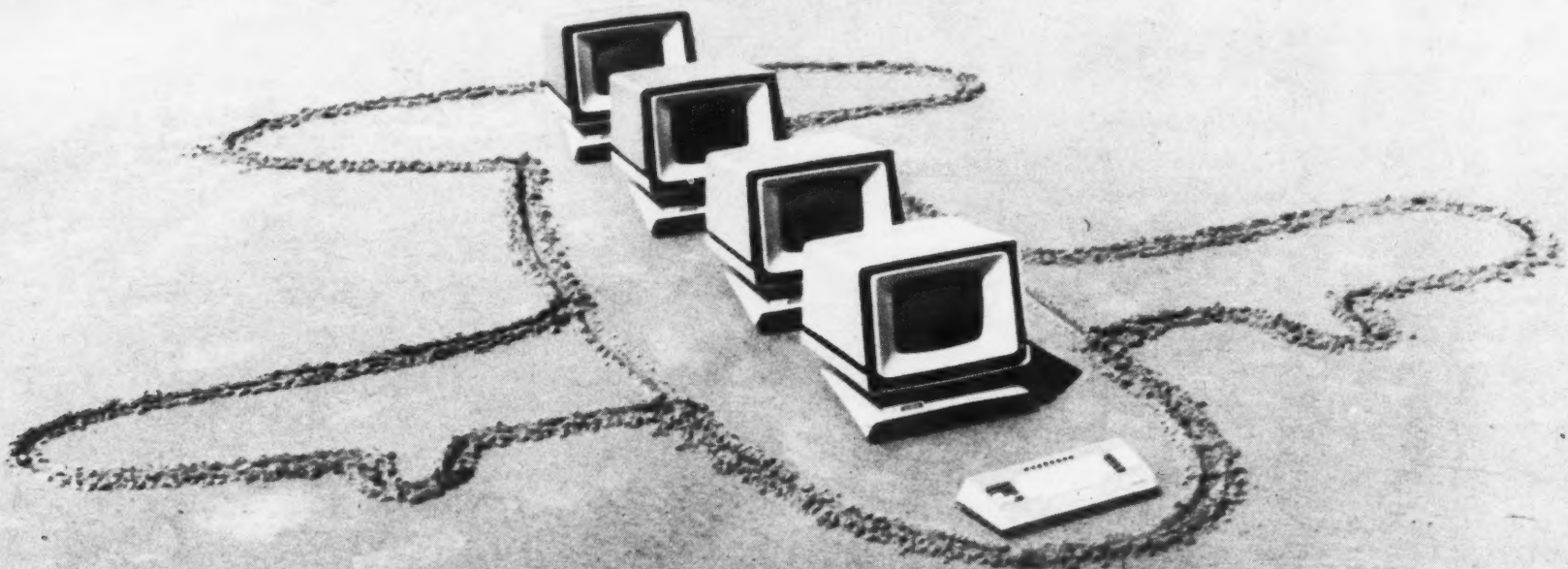
based display terminal, containing 2 cassette tapes, is an ideal system for applications in remote source data entry and as a stand alone small computer. Also on display are the 2200/Tape, a 9 channel industry compatible mag tape transport, the 2200/Printer a 30 cps., 132 column impact printer. A full range of services are also provided, including Business and Communications software.

COMPAT CORPORATION Subsidiary of DATA 100

177 Cantiague Rock Road
Westbury, New York 11590
Tel: (516) 822-1320
Booth No.406

Model 78 Programmed Terminal — Programmed processor that may be configured with card reader, punches, printers, paper tape, magnetic tape, plotters, CRT's and TTY's. Software offers a wide variety of field proven synchronous and asynchronous line disciplines such as IBM 360/20 and 2780; Univac 1004, DCT 2000 and 9000; and CDC 200 UT.

Compat 88-23 Batch Data Terminal — stored program processor for information accumulation and communication. Features anytime editing; flexible format control; 64,000 character data storage. Peripherals include typewriter, line printer, paper tape, magnetic tape.



Ends Future Shock

The world changes. So will your business. So should your terminal.

INCOTERM's customers... airlines, banks, hospitals... will discover a future free of the usual shock; you can, too. Meet the system demands of a new generation of computers... the operational demands of a new breed of businessman... with quick, inexpensive program changes at an "intelligent" terminal. Never any hardware or central site obsolescence.

That's why over a thousand INCOTERM displays are at work today.

Operators change functions, even keyboard layouts, at the touch of a button. Your terminal system changes itself as your business changes.

Unique features, too. Like the ability to communicate with several computers or networks at once. Or to talk to other terminals independent of a central computer. Or to share memory with other terminals in the network.

Tomorrow is flying your way rapidly. Consider that when you select a terminal for today. Consider the "intelligent" alternative.

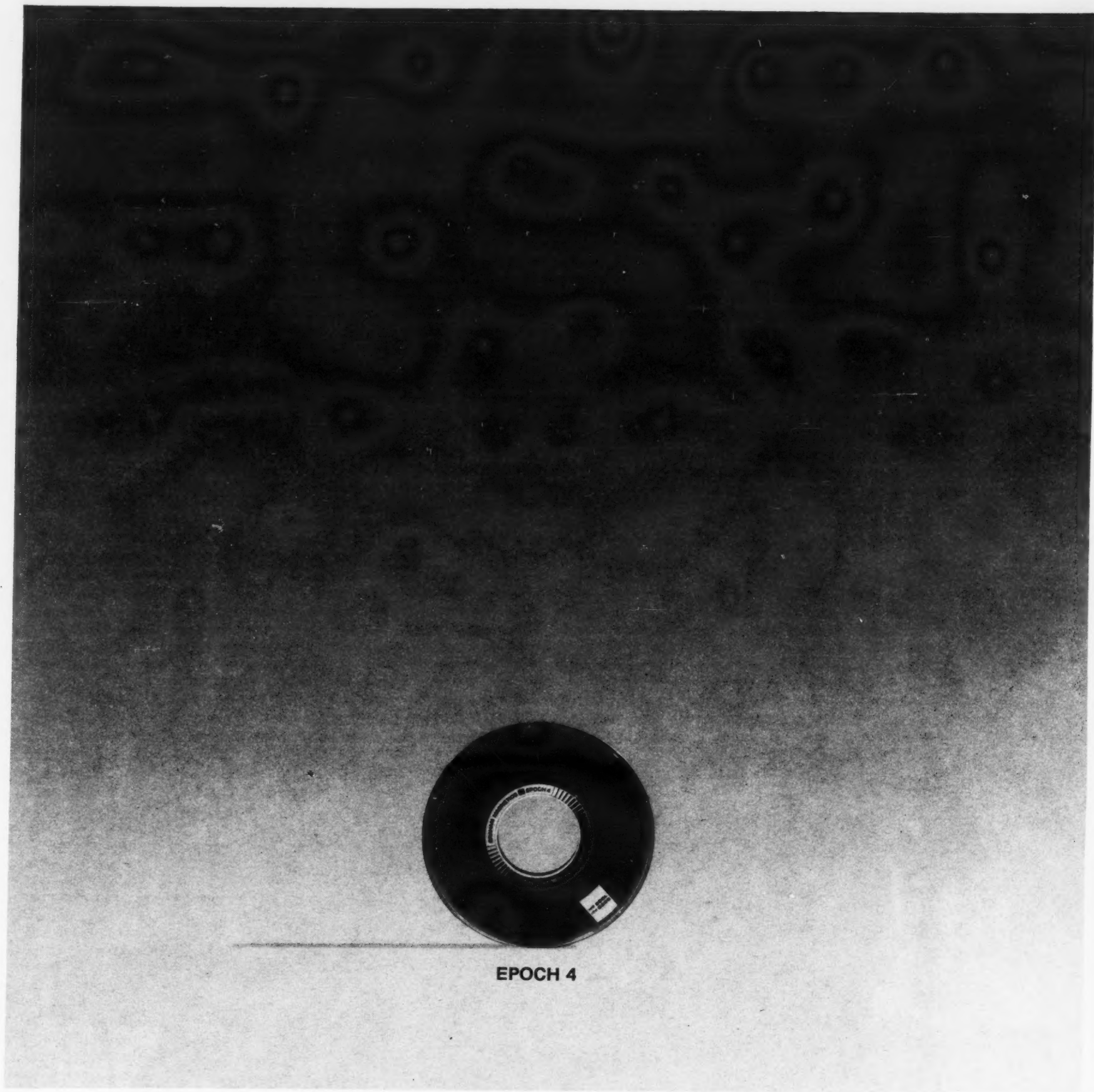
INCOTERM
CORPORATION

... the international computer terminals people

8 Strathmore Road / Natick, Massachusetts 01760

Tel: (617) 855-6100

In Detroit see Jim Beckman — Western Regional Manager — or call (312) 593-2230



EPOCH 4

**This is a group photo
of every tape in the world
with a 20-year warranty.**

 **GRAHAM
MAGNETICS**

GRAHAM, TEXAS 76046

CalComp unpacks in Detroit on April 25.

Come see us. We're a big part of the Computer Caravan.
Here's what we'll be unpacking for the show:

Dual Density Disk Systems.

They store more than IBM's. We lease for less, too.

Plotter Systems.

We taught the computer to draw. We've been
learning new applications ever since.

Tape Systems.

Our newest addition. It's plug-compatible
with IBM.

We'd like to meet you. We'd like you
to come to our seminar. We'd like
to help you in three different ways.



DATA 100 CORPORATION
7725 Washington Avenue, South
Minneapolis, Mn. 55435
Tel: (612) 941-6500
Booth No.'s 406-407

Model 78 Programmed Terminal — Programmed processor that may be configured with card reader, punches, printers, paper tape, magnetic tape, plotters, CRT's and TTY's. Software offers a wide variety of field proven synchronous and asynchronous line disciplines such as IBM 360/20 and 2780; Univac 1004, DCT 2000 and 9000; and CDC 200 UT.

Compat 88-23 Batch Data Terminal — stored program processor for information accumulation and communication. Features anytime editing; flexible format control; 64,000 character data storage. Peripherals include typewriter, line printer, paper tape, magnetic tape.

DIGITRONICS CORPORATION
1 Albertson Avenue
Albertson, N.Y. 11507
Tel: (516) 484-1000
Booth No. 218

Digitronics will show on the Computer Caravan its Model 200 Line Printer and Series 1600 Magnetic Tape Transport. This equipment, now available with plug-to-plug interfaces for a wide variety of minicomputers.

The Model 200 Line Printer features print quality equal to that of printers selling for more than 4 times its price, a swinging yoke for easy paper loading, a flexible font belt, universal multi-font buffer, and 8-channel, vertical format unit. It operates at 200 LPM with a 64 character font.

The 1600 Series consists of 12 different configurations of IBM-compatible magnetic tape transports all having these unique features: a unique leader clamp system that simplifies threading and prevents tape spilling, easy snap-on, snap-off reel loading and the latest in servo technology for positive tape control.

EASTMAN KODAK COMPANY
Business Systems Markets Division
343 State Street
Rochester, NY 14650
Tel: (716) 724-4539
Booth No.'s 213-214

Eastman Kodak will show how KODAK COM Systems contribute to Computer Output Management. Also shown will be the Hewlett-Packard Magnetic Tape Reformatting System which provides an interface to Kodak KOM Microfilmers, expanding the utility and convenience of COM systems for DP personnel. Featured are integral 7/9 switchable tape drive, 200 to 1600

BPI selection, a main frame with 4K 16-bit words and expandable core, and multiple I/O options. Software supports basic printer formats and Kodak KOM Microfilmer native mode.

GRAHAM MAGNETICS INCORPORATED
Graham
Texas, 76046
Tel: (817) 549-4500
Booth No. 207

Epoch-4, the world's first permanent computer tape, will be demonstrated in a "free film" form, dramatically illustrating its toughness in contrast to competitive binder systems. A highly sensitive Instron

tester will be shown pulling free film samples while graphing the stress strain curve. As a result, the ability of the coating to withstand physical punishment and abuse is presented in precise engineering parameters.

HAZELTINE CORPORATION
Greenlawn
New York 11740
Tel: (516) 549-8800
Booth No.'s 404-405

Hazeltine 2000 Video Display Terminal, featuring a fully-buffered 1,998 character display, switch-selectable transmission rates to 9,600 bps and higher, split-screen, format capability, automatic tabulation, variable field transmission, complete editing capability, direct

cursor addressability, automatic or selective scrolling, protected data, remote keyboard.

Hazeltine "Dual" Tape Cassette Units, operable under operator or CPU control. Each of two cassette drives stores 150,000 characters. Operates in either paper tape emulation mode or batch mode at speeds up to 1,200 baud. Hazeltine Printer Unit — silent, 30 characters per second.

HEWLETT PACKARD COMPANY
1100 Wolfe Road
Cupertino, CA. 95014
Tel: (408) 257-7000
Booth No.'s 308-310

Hewlett Packard Company Data Products Group cordially invites you to visit our booth. On display

The first compact data storage system to combine tape economy with disc performance.

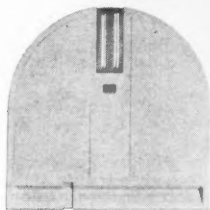
IODISC series one is new. Low in cost. Extremely high in performance. And remarkably compact. Using a small, two-megabit "cartridisc" cartridge (containing a low cost, flexible disc), the series one disc systems offer all of the advantages of non-contact, flying head recording at a cost comparable to slower tape cassette systems. Series one technical features are impressive. An average access time of 60 ms. Data transfer rate of 1.2 megabits per second. And start and stop times of 3 seconds. The series one module with dual drive, either desk top console or rack mounted, is only 7 x 19 x 23 inches.

Series one is available as a complete data storage system interfaced to most minicomputers, or as separate OEM components. IODISC series one is the first very small data storage system to offer high performance, fast random access, versatile I/O and outstanding reliability. Write or call us for full information. Iomec Inc., 345 Mathew Street, Santa Clara, California 95050. (408) 246-2950.

Iomec Inc



IODISC SERIES ONE



is our 2120-A Disc Operating System, the 2100-A minicomputer featuring the new Writable Control Store option, graphic plotters, optical mark sense card readers and calculator systems.

INCOTERM CORPORATION

Six Strathmore Road
Natick, MA. 01760
Tel: (617) 655-6100
Booth No.'s 204-205

INCOTERM will exhibit the SPD 10/20, Stored Program Display and peripheral devices including the SPD-T Tape Cassette Transport and SPD-P-165 Printer.

The SPD 10/20 contains a minicomputer built right into the display cabinet. The characteristics of the SPD 10/20 will be changed in a

matter of seconds to demonstrate the flexibility of the device.

The SPD 10/20 is in production. We can deliver today to satisfy your present requirements. What we deliver today can be easily adapted, through software, to fulfill tomorrow's needs.

INTERDATA, INC.

Two Crescent Place
Oceanport, N.J. 07757
Tel: (201) 229-4040
Booth No.'s 306-307

Interdata will exhibit several members of its New Series of processors which includes the Models 70 and 80, general purpose machines; and the Models 50 and 55, special purpose data communications processors. The fastest member of the

New Series, the Model 80 features 240 nanosecond semi-conductor main memory. All processors are available with complete software packages and a full line of peripherals.

INTERNATIONAL COMMUNICATIONS CORPORATION

A Milgo Company
7620 N.W. 36th Avenue
Miami, Florida 33147
Tel: (305) 691-1220
Booth No. 217

International Communications Corporation will display a complete line of data communication products, featuring high-speed modems for data transmission over dial-up phone lines or leased data lines. The ICC display will also include data

communication test equipment and accessories. Experienced personnel will be in attendance for consultation.

IOMEC, INC.

345 Mathew Street
Santa Clara, CA. 95050
Tel: (408) 246-2950
Booth No. 305

I/O Disc Series One, the first compact data storage system to combine tape economy with disc performance, will be introduced by IOMEC, Inc. The system is a compact disk drive using an eight inch "Cartridisk" cartridge containing an inexpensive flexible disc with 250 K byte capacity. The compact Series One desk top console, with dual drives, measures seven inches by nineteen inches by twenty-three inches. Series One is available as a complete data storage system interfaced to most minicomputers, or as separate OEM components.

ITEL CORPORATION

One Embarcadero Center
San Francisco, CA. 94111
Tel: (415) 989-4220
Booth No. 215

Featured at ITEL's booth are two new IBM System/370 plug-to-plug compatible products: Monolithic Main Memory and 7330 Disk Drives. The Monolithic Memory (manufactured by Advanced Memory Systems, Inc.) handles all size changes and can be leased or purchased. The 7330 Disk Drive utilizes a single spindle to store 100,000,000 bytes per drive with an average access time of 27 milliseconds. The new drives are manufactured by ITEL's Information Storage System Division.

LOCKHEED ELECTRONICS COMPANY, INC.

Data Products Division
6201 East Randolph Street
Los Angeles, CA. 90040
Tel: (213) 722-6810
Booth No. 101

NEW PRODUCT INTRODUCTION: SUE, the System-User-Engineered minicomputer, features micromodularity. From a set of independent modules and peripherals SUE can be assembled in nearly endless configurations to offer maximum price/performance for the application. A wide-bandwidth common bus architecture is ideal for high-throughput applications. Highly competitive multi-unit pricing. Lockheed Data Products also announces the MM-365 replacement memory for large-scale IBM System 360 as well as several low-cost, high-speed commercial core memories. All types of complex multi-layer printed circuit boards are manufactured by the company.

Tom Watson presents our newest way to reduce time-sharing costs.

"He's in charge of our new EDT-300 terminal and he doesn't work for IBM."

Z. V. Zakarian, president
Western Union
Data Services Company.



Our new 30 c.p.s. data terminal cuts in half the cost of computer connect time, compared to 10 c.p.s. terminals.

It leases for as little as \$125 a month. (You can figure out how much you'll save on your monthly time-sharing bill.)

This high-speed terminal can also reduce your telephone line costs, not to mention freeing up needed lines.

Minor advantage: it is a very quiet machine.

The EDT-300 was developed by General Electric working with Western Union Data Services Company. The objective was reliability. (After all, maintenance is our responsibility.)

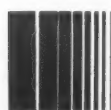
The objective has been realized. This is

the most reliable 30 c.p.s. electronic printer available. But since we have yet to achieve perfection, it's backed by Termicare™ our free nationwide repair service for all our terminals.

There are two EDT-300 models. One is acoustic-coupled with either originate-answer or originate-only modems. The other is originate-only to work with data access arrangements.

And of course we still offer our range of Model 33 and 35 data terminals.

For information call our Tom Watson toll free at 800-631-7050 (in New Jersey 201-529-1170). Or write him at Western Union Data Services Company, 16 McKee Drive, Mahwah, N.J. 07430.



western union data services company

MILGO ELECTRONIC CORPORATION (ICC)
7620 N.W. 36th Avenue
Miami, Florida 33147
Tel: (305) 691-1220
Booth No.217

International Communications Corporation (A Milgo Company) will display a complete line of data communications products, featuring high-speed modems for data transmission over dial-up phone lines or leased data lines. The ICC display will also include data communication test equipment and accessories. Experienced personnel will be in attendance for consultation.

NASHUA CORPORATION
44 Franklin Street
Nashua, NH 03060
Tel: (603) 883-7711
Booth No.403

Nashua Corporation of Nashua, New Hampshire displaying its complete line of disc packs and disc cartridges for computers, including computer magnetic tape.

Display to include: 4406 Disc Pack (IBM 1316 Compatible), 4411 Disc Pack (IBM 2316 Compatible), H411 Disc Pack (Honeywell 273, 274 Compatible), 4415 Disc Cartridge (IBM 2315 Compatible), 4440 Disc Cartridge (IBM 5440 Compatible), 4436 Disc Pack (IBM 3336 Compatible), Computer Tapes.

Nashua's newest disc pack, the 4436, (IBM 3336 Compatible) stores in excess of 100,000,000 Bytes of data. Don't miss seeing this disc pack!

NOVAR CORPORATION
2370 Charleston Road
Mountain View, CA. 94040
Tel: (415) 964-3900
Booth No.203

Novar terminals and telecommunication systems, including auxiliary devices.

SANDERS DATA SYSTEMS, INC.
95 Canal Street
Nashua, NH 03060
Tel: (603) 885-4208
Booth No.'s201-202

Sanders Data Systems, Inc. will exhibit the System 804 Stand-Alone model of Sanders' Series 800 Programmable Terminal Systems. The complete product line of peripherals, excluding disk, will be shown in operation. Two printers, (one high speed - 300 LPM and one low speed - 30 CPS), a tape cassette for loading programs and retrieval and storage of data and a 300 CPM card reader for loading programs or data. One 804 will be used primarily for the demonstration of local data entry, retrieval and storage. The other 804 will demonstrate the programmability of the terminal by showing a variety of programs including data product emulation.

SYCOR, INC.
100 Phoenix Drive
Ann Arbor, Michigan 48104
(313) 971-0900
Booth No.'s105-106

Sycor will display its System 20 - a complete data entry and communications system for branch offices. The System 20 incorporates a Model 340 Intelligent Terminal with 12 K bytes of memory, 1,000 cps cassette recorders, 1200-2400 baud BSC communications, and a 30 cps impact printer. Sycor also will feature its System 40 - the first cassette terminal with HASP compatibility. The System 40 is composed of a Model 340 Intelligent Terminal, 12 K bytes of memory, 2,000-2,400 baud BSC communications, a 250 cpm card read-

er, and a 200 lpm line printer. Sycor provided software can be executed from either system.

TALLY CORPORATION
8301 South 180th Street
Kent, WN 98031
Tel: (206) 251-5625
Booth No.'s210-211

The Tally DATASCRIBE product line on exhibit is a data preparation and batch terminal system with outstanding configuration flexibility for handling varied data volumes and application requirements. The user has a choice of peripherals for remote batch applications including punched card and paper tape, and either 600 lpm or 100 lpm output printers. The new Tally 100 lpm

impact printer on display is also available as a free-standing receive-only terminal for remote printing in a 1200 baud network.

TECHTRAN INDUSTRIES, INC.
580 Jefferson Road
Rochester, NY 14623
Tel: (716) 271-7953
Booth No209

4100 Communications Terminal - operator oriented Cassette data terminals featuring 110-2400 baud speeds, TTY & RS-232 Interfaces, High Speed Search, Full Remote Control, Data Edit, Switch Selectable On-line/Off-line capability and both USASC11 Coded & IBM 2741 Compatible models. Plugs into most data terminals and mini-computers.

Here's What DATA 100 Is Doing For Over 700 Terminal Users Today...

DATA 100 Model 78, Model 70, and Model 88-23 Terminals are at work right now saving users money and speeding up data communications in talking with 360's, 370's, 6600's, 1108, and Spectras throughout the world. DATA 100, the leading supplier of plug-in replacement Batch Terminals, offers the following products:

Model 70 Remote Batch Terminal truly plug-compatible with 2780 featuring—

- Faster throughput on lines up to 9600 BPS.
- Selection of following peripherals: 300 & 600 CPM card readers, 300, 400, 600 LPM line printers, card punch.
- 15% to 30% savings in monthly rental.

Model 78 Programmed Batch Terminal, plug compatible with 360/20 featuring—

- Simulation of 2780, 1004, DCT 2000, and 200 UT Terminals.
- All Model 70 peripherals plus magnetic tape, paper tape, CRT's and TTY's.
- Capability to concentrate data input from low speed terminals for high speed transmission to central computer.
- 30% to 50% savings in monthly rentals.
- Interleaving data transmission.
- Magnetic tape applications to fit your requirements

Compat Model 88-23 family of Data Entry Terminals that—

- Validate input data at source and transmit directly to 360/370 central computer.
- Offers optional central off-line pooling of remote data entry terminals, thus freeing CPU of communications processing.
- Offers application software for order processing, billing, inventory control, and many others.

Find out today what DATA 100 can do for you to help solve your data communications problems with quality products, on-time delivery, and competitive pricing—all backed up with an established sales and service organization.

DATA 100 CORPORATION

MIDWEST:
Minneapolis, MN 612/941-6500
Chicago, IL 312/992-0850
Detroit, MI 313/642-3383
Lansing, MI 517/489-1700
St. Louis, MO 314/878-4911
Dallas, TX 214/638-7946
Houston, TX 713/772-2483
Dayton, OH 513/278-6723

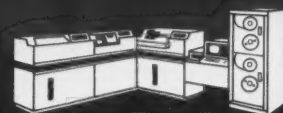
SOUTHEASTERN:
Washington, DC 703/893-4356
Nashville, TN 615/329-3699
Greensboro, NC 919/273-6789
Raleigh, NC 919/782-2185
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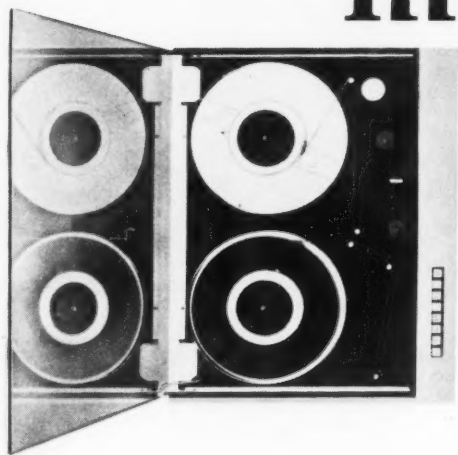
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Take our line printer...only slightly larger than a typewriter, its print quality is equal to or better than that of \$30,000 machines with the sixth copy almost as clear and crisp as the first.* It has a swinging yoke for easy front loading of paper and ribbon replacement, plus a simply-changed font belt, so that a clerk can operate it like a veteran with minimum instruction.

Our magnetic tape transports come in a wide range of speeds and tape densities. Tape threading is eliminated by a unique leader clamp system and reel loading is a one-hand operation because of our snap-on/snap-off hub release.* The self-contained formatter saves both cost and space. Incorporating the latest in technology and packaging, the transports are highly reliable and easy to maintain.

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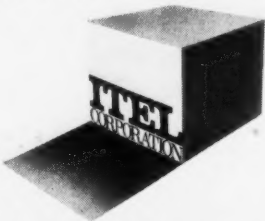
Now there's a single-spindle storage subsystem for massive data bases up to 100 million bytes: the new ITEL 7330 Disk Drive. Using standard IBM 3336 disk packs, the ITEL 7330 increases storage capacity more than three times over previous models to 800 million bytes for an 8-drive subsystem. It's plug-to-plug compatible with IBM System/370. And it's quick on the draw; average access time is just 27 milliseconds.

The ITEL 7330 provides the high-capacity storage needed for management information systems, teleprocessing, multiprocessing and time-sharing systems. It offers a number of advantages over its IBM counterpart and other disk storage units. Each 7330 has a single spindle, so you can specify from 1 to 8 drives under one controller for maximum flexibility. The unit has a waist-high slide-back cover, for quick and easy disk change. All internal components are easily accessible. And its

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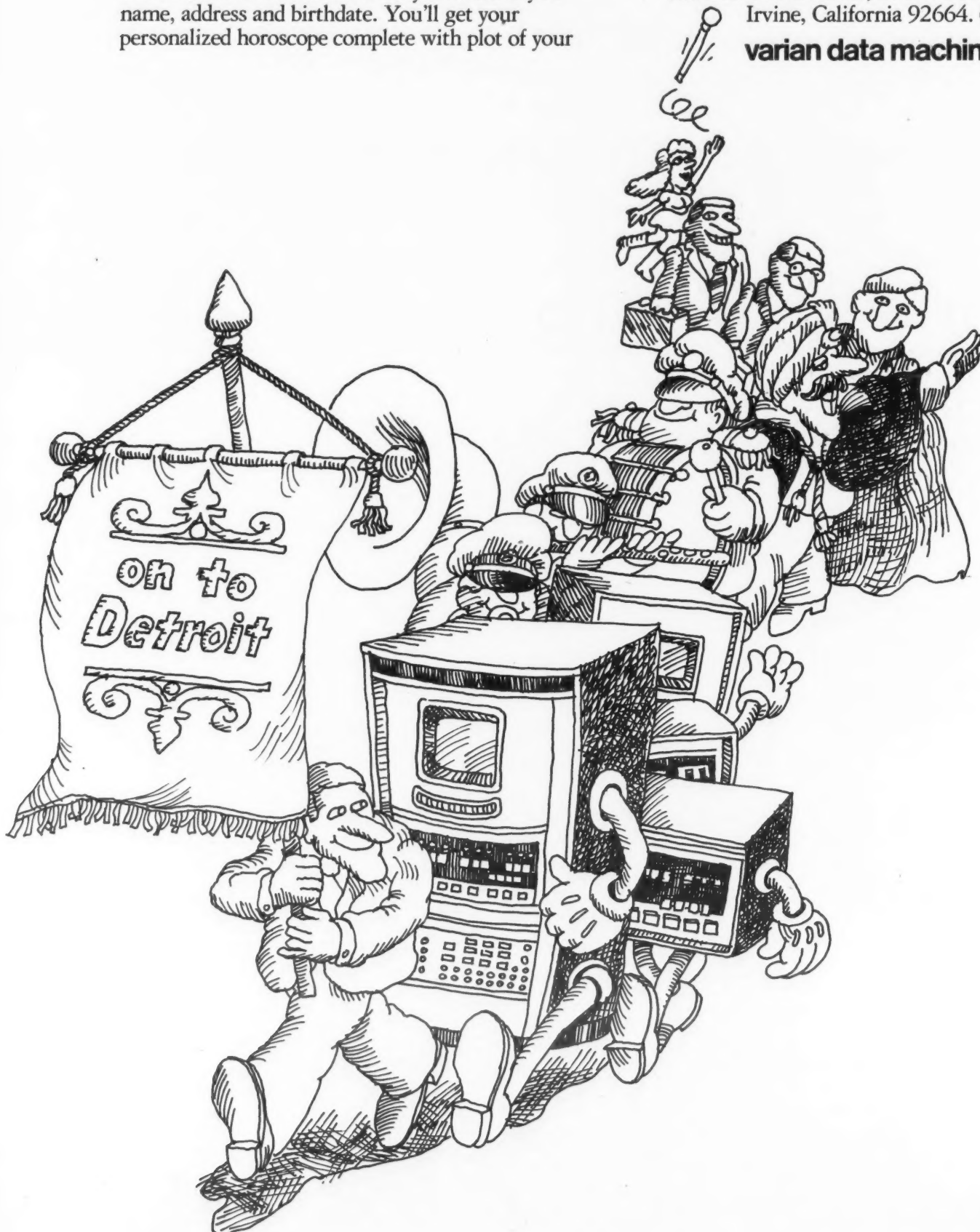
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Bits and Pieces

Battery-Operated Terminal Includes Acoustic Coupler

BROOKLYN, N.Y. — The Dataline battery-operated portable Data Terminal is designed to provide two-way 103-type modem-compatible communications via standard telephone lines.

The Data Terminal includes an acoustic coupler, alphanumeric Ascii keyboard and a digital strip printer housed in a carrying case.

The unit can be operated for more than four hours from the battery. Recharging equipment is included with the unit. The Data Terminal costs \$1,500 and is available on a 30-day delivery from the Dataline Division of Heller Roberts Instruments Corp., 700 Jamaica Ave., 11208.

DEC Cuts Maintenance Cost

MAYNARD, Mass. — Reduced prices on extended field service maintenance contracts by Digital Equipment Corp. went into effect April 1. The new rates apply to 12-, 16-, 20- and 24-hour, Monday to Friday maintenance agreements. All other rates remain the same.

The new rates mean a reduction of 3% to 25% in the cost of extended maintenance contracts depending upon the type of equipment serviced and the daily hourly coverage, DEC explained.

Unit Computes Commissions

SANTA MONICA, Calif. — An inexpensive desktop machine with special keys that instantly compute commissions on multiple executions of stock transactions has been introduced by Computer Design Corp.

The Stock Trader computes taxes and prorates commissions for each execution and for a total transaction, and prints out a complete audit record. When not used for computing stock commissions, it is a general-purpose printing calculator.

The Stock Trader costs \$1,495 and may be rented or leased from 1730 Twenty-First Street., 90404.

SEL Has Universal Interface

FORT LAUDERDALE, Fla. — A universal interface capable of linking any of its 16-bit or 32-bit computers to real-time processes has been announced by Systems Engineering Laboratories, Inc. (SEL).

The company expects to use the interface with about 70% of the systems it delivers at a savings of about 30% in interface costs to the user, SEL said.

A typical interface will cost about \$7,500. Deliveries will begin in June from 6901 W. Sunrise Blvd., 33313.

Tape Winder Fits All Teletypes

LISLE, Ill. — Ribbon & Ticker Paper Co. offers a line of heavy duty paper tape handling systems. Systems are available for all model Teletype machines. A tape tension/motor control arm eliminates slip clutch wear, temperature rise and excessive motor wear. Units are available from stock, priced from \$75 from P.O. Box 335, 60532.

Sorbus to Service Sycor Systems

KING OF PRUSSIA, Pa. — Sorbus Inc., has signed a nationwide maintenance contract with Sycor Inc. Sorbus will service the system from offices that serve over 90 U.S. cities.

Solid State Memory

Qantel Business Systems Get New CPU

By Frank Piasta
Of the CW Staff

HAYWARD, Calif. — Qantel Corp. has updated its business-oriented stand-alone and terminal processor systems with the Q Series of CPUs.

The Q Series processor consists almost exclusively of integrated circuits, with main memory storage provided by an 8-bit byte-oriented solid state memory.

The basic unit of 4K can be field-upgraded to 8K, 16K or 32K bytes. Cycle time is 1.5 μ sec and access time is 1 μ sec.

Macroinstructions

A 1,540 byte, 50 nsec ROM (read-only memory), expandable to 2K, is used for internal processor control. Stored microprograms are called by macroinstructions in the user or systems software. Special microprograms can be supplied in a special ROM or may be taken from main

memory by selecting a microinstruction mode permitting data manipulation at the register and I/O bus level.

The macroinstruction set contains 46 business-oriented instructions, including bit/byte manipulation, branching, I/O and decimal arithmetic.

Software includes a basic assembly language and Cobol-like Q/Bal. The Q/RPG report generator will be available during the second quarter of 1972.

The Qantel V, which the Q Series supercedes, was available in core memory of 4K or 8K with a cycle time of 3 μ sec and an access time of 2 μ sec. A 1K ROM was provided.

Twelve I/O channels with a data rate of 144 kbyte/sec are included in the Q Series. Up to nine of the channels can be used as direct access channels to main memory, using cycle stealing, providing a data transfer rate of 666 kbyte/sec.

The basic systems of 4K or 8K memories include an I/O typewriter with Formliner, desk and power supply. The 16K and 32K byte versions include the AA-2 Programmers Control console.

Peripherals include half-inch magnetic tape drives, removable pack, 7.6M and 30.7M byte disk drives, card reader, serial printer, line printers, paper tape reader/punch, 12-in. CRT display and a 10-key numeric input module.

'Daisy Chaining'

By multiplexing such items as video terminals and "daisy-chaining" items such as magnetic tape units on a single controller, as many as 30 to 40 devices can be attached to a Qantel system.

A typical configuration might include 24 CRT terminals, six tape drives, disk drive, I/O typewriter line printer, card reader, console and 10-key entry device.

A communications controller handles from 75 to 4,800 bit/sec, synchronous or asynchronous, and can exchange data with any major computer over commercial telephone lines. A controller accommodates an automatic calling and answering unit.

Prices of the basic 4K Q Series system are \$12,315 and \$300/mo on a 36-month lease. Maintenance is \$57/mo and delivery is two months from 3474 Investment Blvd., 94545.

PDP-11 Prices Cut, DEC Adds 2 Products

MAYNARD, Mass. — Digital Equipment Corp. has reduced prices on PDP-11 mini-computer systems by 13% to 24%. The lower prices were made possible by the introduction of two DEC-manufactured memory systems — a cartridge disk drive unit and an 8K core memory system, DEC explained.

The new RK05 DEC pack cartridge disk drive replaces a similar DEC system and is priced at \$5,100 compared to \$8,000 for the previous unit.

Stripped-Down Xerox Sigma 6 Will Cost Schools \$6,000/mo

EL SEGUNDO, Calif. — Educational institutions may now obtain a stripped down low-cost version of Xerox Corp.'s medium-to-large-scale, time-shared Sigma 6 computer.

Designated the Sigma 6E, this education-oriented version is intended to make the basic capabilities of the Xerox Sigma 6 more accessible to smaller universities and colleges, community colleges and other educational institutions wishing to begin multiprogrammable, multimode computing with a minimum investment, Xerox said.

\$6,000/mo Bracket

"For the first time, small colleges and junior colleges — with data processing budgets in the \$6,000/mo bracket — can perform their administrative processing and simultaneously offer on-line computer access to students and researchers," said Donald E. McKee, vice-president, computer marketing, in the company's

information systems group.

Using a new version of the Xerox BTM (Batch Time-Sharing Monitor) operating system requiring only 32K words (128K bytes) of core, a Sigma 6E accommodates eight communications lines for time-sharing use along with concurrent batch processing. After installation, it can easily be expanded from the basic 32K-word system to a standard Sigma 6 with up to 128K words (512K bytes) of core memory.

The 6E version includes 32K words of core memory, removable dual-spindle disk storage unit (50 Mbytes of storage) and controller, communications equipment for eight time-sharing lines and a teletypewriter. A typical system for educational institutions, with maintenance contract — would cost approximately \$6,100/mo under the Xerox installment purchase plan.

The Sigma 6E system is now available.

RPQ Emulators on 370 CPUs Offered for Honeywell, RCA

WHITE PLAINS, N.Y. — IBM's new emulators on an RPQ basis makes it easier for RCA and Honeywell users to switch to the 370.

Designed to run on the 135 and 145 under DOS, the features include special microcode as well as software to enable unaltered RCA 301 and Honeywell 200 Series programs to be run on the IBM systems.

Emulators for non-IBM systems have previously been offered on IBM computers.

Console File Included

A console file containing the microcode is included in the emulator and requires 4,400 bytes on the 135 for the RCA 301 emulator, and 6,000 bytes on the 145. The Honeywell emulator requires 7,700 bytes on the 135 and 8,600 to 9,000 bytes on the 145.

The 370/135 can run Honeywell programs from .6 to .9 times as fast as the Honeywell 125. The 145 is 1.2 to 1.7 times as fast. On the 135, RCA 301 programs run 1.4 to 2.2 times as fast as on the native machine. The same programs on the 145 would run from 2.4 to 3.7 times as fast.

The minimum configuration required by the emulators includes the compatibility feature; sufficient main storage for DOS, emulator, tape buffers and the emulated memory; plus peripherals required by DOS and those needed by the emulated program. No special peripherals are required by the emulators, IBM said.

The RCA 301 emulator costs \$675/mo, and the Honeywell 200 emulator is \$625/mo. They will be available during the first quarter of 1973.

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Provides Instant Backup

Enhancement Lets 494s Share Memory

BLUE BELL, Pa. — Univac 494 users with two or more processors can tie two of them together into a common data base with an enhancement from the company.

The majority of 494 users, Univac said, already have multiple 494s to provide backup in the real-time applications for which the systems are used. The dual processor hardware will enable the user to provide a common pool of peripherals to both CPUs and to let them share a portion of both systems' main memories.

The two processors generally will function as separate and distinct units. The uppermost addresses in both CPUs are designated by the user as available to either 494, in increments of 2K 30-bit words from 8K to 32K. A write command in either CPU that addresses the designated area of memory will cause the data to be written in the same address in both memories.

Dual Storage Controller

The write commands are intercepted by the Dual Storage Controller. Typically, Univac said, the

common memory area would be used for file access tables, operating systems tables and file indices.

The Shared Peripheral Interface lets both CPUs share the same bank of peripherals. The buffered device also resolves conflicts between the processors.

Backup Interface Available

The multiple 494 user who wants to place two of his 494s on line with another available as backup can get another interface. The enhancement, Univac said, furnishes an effective means of providing redundancy to replace either of the on-line systems.

Each of the processors has its own software operating system allowing the user to retain his current software without modification. Special operating system software, an extension of the company's Omega system, is being developed.

The dual processor option will add about \$8,000/mo to the cost of the dual 494 systems. The third CPU interface is priced at \$4,000.

First deliveries are scheduled for March, 1973.

Two Disk Drives Made For Varian 620 Minis

IRVINE, Calif. — Varian Data Machines has added two disk drives to its line of peripherals for the 620 minicomputers.

The 620-35 is a 29 Mbyte disk drive for use with the Varian 620/f computers. It has a transfer rate of 156K 16-bit word/sec and an average access time of 10 msec. A single controller can handle up to three slave units for a total on-line capacity of 58 words. The drive and control combined are priced at \$24,000, and the slave drives at \$17,000 each.

Varian also added a dual platter disk drive to its line, doubling the storage available to Vortex system users at an increase in price. The dual platter disk drive, the 620-36, has one fixed and one removable disk, each with a storage capacity of 1.17M 16-bit words.

The 620-36 has a transfer rate of 92K word/sec and an average access time of 20 msec. The controller can handle both a master and a slave unit, each with 2.34 M words for a total storage capacity of 4.68M 16-bit words. The master unit with controller is priced at \$12,500, the slave at \$8,000.

The 620-35 is designed to operate under Varian's Master Operating System (MOS) while the 620-36 can be used with either the MOS or Vortex operating systems.

Varian Data Machines is at 2722 Michelson Drive, 92664.

Intelligent Terminal Emulates TC 500/700

NATICK, Mass. — Incoterm Corp. has developed an emulation package, compatible with Burroughs TC 500/700 DCP Firmware sets, for its SPD 10/20 intelligent CRT display terminal.

The SPD 10/20, when loaded with software compatible with the DCP Firmware, can be used on the same communication network as TC 500/700 terminals, and provides such users with programmable CRT capability, the company said. Programs can be loaded from the central site giving the operator complete flexibility by equipping the CRT with data entry, inquiry and other applications packages.

The SPD 10/20 can be equipped with printers with print speeds up to 165 char./sec cassette tape transports and auxiliary core storage to give the Burroughs user additional terminal intelligence.

An SPD 10/20 single display with TC-500/700 poll/select communications software costs \$5,800. Rental is \$195/mo and maintenance is \$30/mo. A dial display version costs \$7,500. The rental price is \$250/mo and the maintenance charge is \$45/mo. Delivery is 90 days from 6 Strathmore Road, 01760.

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Group/3 Gathers Diversified Services for S/3 Users

By Edward J. Bride

Of the CW Staff

LOS ANGELES — A new consulting company plans to offer System 3 users a variety of information, education and evaluation services plus discounts on products.

Because S/3 users have small, scattered installations, often in rural areas, the new company, Group/3, will provide subscribers with problem-solving capabilities that larger installations have in-house. This service allows subscribers to make free telephone calls over a Wats line to the Group/3 data center here whenever they have a problem. This puts the same kind of professional staff at the user's disposal that he would have in-house if he operated a large installation.

Other services will include discounts on hardware and software, product evaluations, seminars, a journal and a software exchange. Subscribers also will receive *Computerworld* through Group/3.

The subscription fee will be \$20/mo, payable quarterly, although charter subscribers can sign up for \$10/mo for the first year until June 30.

Group/3 is headed by David E. Ferguson, one of the original employees of Computer Sciences Corp., and later founder of Programmatic, Inc.

Group/3's first product is Stap, an as-

The Small Systems User

sembler for either card-or disk-oriented S/3s. Stap/C works in an 8K card system and has no IBM equivalent, Ferguson said. Stap/D is a "superfast disk system" which costs subscribers \$39/mo less than the IBM assembler.

Stap/C leases to subscribers for \$28/mo and non-subscribers for \$35/mo. The disk version is priced at \$36/mo and \$45/mo respectively.

"Some of our programs will be free handouts," Ferguson said. "From a legal standpoint, we might have to charge a dollar for it or something, but our intention wouldn't be to really sell it." Such "free" software will include a core dump program. "It's not a big thing, but it's something that most members wouldn't be able to write," Ferguson said.

Besides its own software development, Ferguson said the firm will test software developed by subscribers, then help market it.

Group/3 will also test new, independently manufactured S/3 products.

"We're going to get the vendor to plug his thing into our computer, or if it's a piece of software, to loan us a copy, and we'll run tests, and we'll print what's right and what's wrong and what the competition has and what the price is," Ferguson said.

The firm will publish the *Group/3 Journal* with articles written by Group/3

staff members to help users solve the "myriad of problems" associated with increasing S/3 usage.

Application handbooks will be available under the extended \$75/mo service program. These will include case studies of successful implementations of "common business and industrial applications" on various S/3 configurations.

Ferguson is president and board chairman of Group/3. Directors are Patrick J. McGovern, CW publisher and president of International Data Corp. (IDC); David Cantor, professor of mathematics at UCLA; James McLean, vice-president of Portafone, Inc.; John Rehfeld, director of the western region of IDC; and Sherman Rifkin, president of Dunlap Advertising. Rifkin coined Group/3's slogan, "Make the most of a good thing," Ferguson noted.

The idea for Group/3 was first test-marketed in Boston, at the opening of CW's Computer Users' Forum and Exposition. Initial reaction was favorable, Ferguson said, so the project was firmed up and a subscription drive is now under way.

Industry sources predict the number of S/3 users will reach 24,000 by the end of 1975, according to Group/3.

There are already 7,000 S/3s installed and another 10,000 on order, Ferguson estimated. Most of these users are entry-level in their expertise, he said. "The System/3 is their first computer, and if they have a question, they used to have no place to go for an answer but to IBM."

Group/3 is in competition with IBM and with some software houses, Ferguson said. It is also in competition with some user groups, most of which provide untested, member-developed software to other members free.

"We feel the developers of new software products should get paid for them," Ferguson added. "I don't believe in free software. I don't think it helps the guy who gets it, either. I think if you get it free, the guy is not going to stand behind it."

The company's headquarters and the data center are at 6399 Wilshire Blvd., Suite 300, 90048.

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UK Emergency Power Relies On Microfiche Backup

LONDON — The National Control Centre, a new centralized, computerized, control facility for electrical power generation and distribution throughout England, Wales and linked to Scotland and France, uses microfiche for backup display.

The center, set up by the Central Electricity Generating Board (CEGB), controls power production and its bulk transmission from 187 power stations containing 849 generators. The energy is distributed over a network comprising a total of almost 11,000 route-miles operated by CEGB and 12 area boards for which the CEGB is the agent.

In the control room a large wall display (approximately 15 feet by 60 feet) displays minute-to-minute operating conditions over the national network. Three control engineers are seated at consoles, each equipped with up to four 21-in. CRTs and other monitoring equipment.

Input to each of the consoles comes from on-line process control computers, which update information twice a minute. More than 1,000 telemetered readings and 7,000 automatic conditions are displayed on the consoles for load dispatching and switching.

A backup for substation display is immediately available during an emergency via system diagrams on microfiche stored in retrieval-display units. From the keyboard on the front of the unit an engineer can retrieve and display the emergency system diagram or procedure in as little as four seconds.

ASM Meeting to Mark 25th Anniversary

MIAMI BEACH — The 1972 International Systems Meeting here, May 21-24, marking the Association for Systems Management's twenty-fifth anniversary, will offer 23 individual seminars and a full-day "mini-conference" on project management.

The sessions feature basic systems analysis, OCR — the future of data entry, on-line systems, the impact of operating systems on programming, and defining and designing management information systems.

Information Security

The session on "Information Integrity in the Computer Environment," led by Paul L. Peck of the Automated Merchandise Processing System, U.S. Bureau of Customs, covers threats to information security through hardware/software malfunctions, unauthorized personnel, unsecured data communications, and negligence and destruction. The utility of various types of safeguards for specific DP environments will be reviewed.

"The Impact of Operating Systems on Programming" highlights some of the technical experiences related to systems implementation. Program debugging suggestions will be made to minimize the associated problems.

During the session on "Functional Management Looks at Systems," the need for a better understanding between the system manager and his department and the financial manager for development of financial control support systems will be examined.

The approach of defining requirements-oriented management information, rather

than concentrating on equipment capability, will be featured in "Defining Management Information Requirements." "Designing MIS to Meet Audit Requirements" will discuss DP areas with the greatest impact on internal control, identifying potential weaknesses and outlining methods for the systems analyst to help eliminate these weaknesses.

General management topics include management

Societies/User Groups

by objectives, training systems personnel and job enrichment.

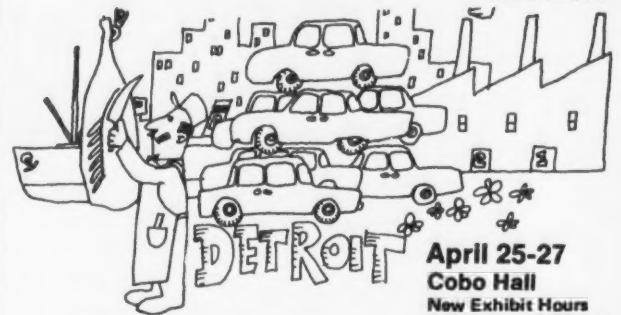
The mini-conference covers such topics as grid approach to planning, project management techniques and overcoming barriers to success.

Registration for the full conference is \$125 for members, \$175 for nonmembers. One-day registration is \$60 and \$75, and two days cost \$120 and \$150. More information is available from ASM headquarters, 24587 Bagley Road, Cleveland, Ohio 44138.

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Afips Head to Speak At Spring Joint

ATLANTIC CITY, N.Y. — Keith W. Uncapher, president of the American Federation of Information Processing Societies (Afips), will assess the "state of the industry" and its future direction, in a speech at the Spring Joint Computer Conference, May 17.

Uncapher will examine major challenges facing the information processing community, underlying factors involved and actions which may be necessary to assure a positive response to industry and social needs.

Calendar

May 9-12, New York — 21st Annual Microfilm Association Convention. Contact: David Banks, National Microfilm Association, 8728 Colesville Road, Silver Spring, Md. 20910.

May 10-13, Boston — 11th Annual Spring Symposium of the Digital Equipment Computer Users' Society. Contact: Angela Cossette, Digital Equipment Corp., Maynard, Mass. 01754.

May 16-18, Atlantic City — Spring Joint Computer Conference. Contact: Afips, 210 Summit Ave., Montvale, N.J. 07645.

May 19-21, Dayton, Ohio — American Society for Information Science First Mid-Year Regional Conference on "Cost Reduction in Information Systems." Contact: Asis, 1140 Connecticut Ave., Suite 804, Washington, D.C. 20036.

May 22-26, Brisbane, Australia — 5th Australian Computer Conference sponsored by the Australian Computer Society, Inc. Contact: Box 1235, G.P.O., Brisbane, Australia.

May 30-June 3, Montreal — The Canadian Computer Show sponsored by the Canadian Information Processing Society in conjunction with the 1972 Canadian Computer Conference June 1-3. Contact: Canadian Computer Show, 481 University Ave., Toronto, Canada.

June 6-8, Park City, Utah — OCR User Association Session on "Real World of OCR." Contact: OCR User Association, 9415 S. Western Ave., Chicago, Ill. 60620.

Mini Travels to Students

Special to Computerworld

SEATTLE — The Highline School District, in Seattle's south end, is utilizing a "let's take the computer to the students" approach. Its Hewlett-Packard minicomputer and its three HP programmable calculators are shuttled from school to school on a scheduled basis. Both high school and junior high students are exposed to computing as an integral part of their education.

Prime mover of the equipment, both figuratively and literally, is Vern Johnson, a full-time data processing coordinator and consultant on Highline's staff. He uses a small station wagon to transport the minicomputers and calculators.

The Highline approach to computing grew out of both past successes and failures. A comprehensive, centralized approach was defined several years ago, but the on-line terminals, which were part of that plan, never materialized.

The central computer, a Univac 9300, just wasn't big enough to handle the remote workload, and the implementation of on-site computing was delayed for several years before the portable approach came along.

Now, the minis travel among Highline's five high schools, each school having each piece of equipment for approximately four weeks a semester. And among the nine junior highs, each has a mini for five weeks a semester and one of the calculators for three.

Columbus Tech Plans Braille Manuals As Follow-Up for Two-Year DP Course

COLUMBUS, Ohio — A three-phase training program for blind students interested in DP, including two years of evaluation and education, and strong follow-up support for graduates, is nearly through the first year of classes at Columbus Technical Institute, a non-profit state-assisted college.

Announced in mid-summer, the evaluation-education phase got under way in September with four students who had undergone aptitude screening. Two of the students were enrolled just for the intensive evaluation segment of the course, which includes administration of a Braille version of IBM's Programmer Aptitude Test (PAT).

The two remaining students are now working with assembler language programming on the school's IBM 360/40. IBM has provided a magnetic tape of all pertinent manuals, which are generated in Grade 1 Braille through a special utility routine. The same routine provides the students with Braille output from their assembly runs and program tests, according to James Taylor, the program coordinator.

In addition to the specific DP training, the Columbus Tech program is designed to give the students a sense of independence once they find industry positions.

Associate's Degree

Graduates of the two-year training program will receive an Associate's Degree in applied business in business DP. An alternate one-year course will be

Education

available for those with a college background or equivalent experience, the institute said.

The second phase of the program is expected to provide graduates and other visually handicapped programmers with a technical library of new manuals, in Braille, large type or recorded form, so that they can keep abreast of new developments. Advanced home study courses and distribution of software packages with Braille documentation are also planned.

The goal of the Columbus Tech effort is to create a center to explore the best methods by which the visually handicapped can use computers. The third phase of the program will attempt to determine what tools and services are needed by blind DPs, and to evaluate tools presently being developed by other interested organizations, Taylor said.

The Institute is at 550 E. Spring St., 43215.

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NCR Neat/3 Classes Given on 2 Levels

DAYTON, Ohio — To meet the needs of both the beginning and experienced programmer, NCR now offers two levels of courses in Neat/3.

Neat/3 is a programming-language developed by NCR for its Century Series. All operating and application programs for the Century computers are written in Neat/3.

Beginning programmers can now take an 18-day elementary systems and software course to achieve basic programming capability. The course includes such areas as introduction to programming, the Neat/3 language, operating software, computer operations and systems design.

Programmers experienced in other languages but not in Neat/3 can take an accelerated five-day course. This includes a hardware overview, compilation, Neat/3 instructions, table-handling, printing concepts and symbolic debugging.

Both courses, offered through NCR Regional Systems Centers, are designed to provide students with Level I programming ability. For those desiring more advanced training, follow-on courses in major functions, chained-file processing and Neat/3 Level II are also provided.

NSF to Aid Teachers Taking Short Course

LAFAYETTE, Ind. — College and university chemistry teachers may apply for support from the National Science Foundation to attend an intensive two-week course on Digital Computers in Chemical Instrumentation, to be held at Purdue University from June 6-24.

Lectures will cover digital logic, digital data acquisition techniques and the use of an on-line CPU with scientific instrumentation, according to Dr. Sam P. Perone. In addition, participants will have "ample opportunity" for laboratory experience, including programming of a small digital computer, Perone said.

Application forms for the course are available from Perone at the department of chemistry, 47907.

Auditors Proofread Corrections

CRT Terminals Responsible for Speedy Tax Process

By Benjamin F. Marsh

Special to Computerworld

Income tax administration in Maryland is more than ordinarily difficult. In 1967 the General Assembly of Maryland enacted a new tax program that imposed a graduated income tax, and authorized 23 counties and the city of Baltimore to levy a local income tax — with the taxpayer using a combined tax return form.

In addition, the new law provided that each of the state's 160 municipalities would receive .37% of the net taxable income of their residents.

Maryland had been using electronic accounting machines since 1940. However, as the new tax bill made its way through the legislature, we knew our current methods would be inadequate.

The automated system we then developed jointly with Director Arthur Southard of the Data Processing Division in the state comptroller's office had two prime objectives: to get the refund checks to the taxpayers as quickly as possible; and eventually to be able to complete the processing of all returns by June 30, the end of the fiscal year.



Benjamin F. Marsh

The task of the income tax administrator would be far simpler if taxpayers didn't make mistakes in filling out their returns. During the first year under the new law about 30% of all returns were incorrectly filled out.

After the returns were edited and coded for the first year, the data on a batch of 5,000 returns was keypunched into tab cards, transferred from cards to mag tape, and checked by the computer for error. Corrections were on the tab cards, and the revised data was keypunched into new cards, transferred to tape, rechecked by the computer and returned to auditors for additional corrections.

Each batch of 5,000 returns was kept intact until all the returns were free of error. Often two weeks were required to get an entire batch clean and processed.

We did not complete our processing that year until Dec. 31. By then, however, we had worked out an improved scheme with the DP Division, and the necessary equipment — visual display terminals that would enable auditors to communicate with the computer — had been ordered.

The revised system was immediately successful.

Keypunching Only Once

Keypunching takes place just once: when information from the returns is initially put on tape. Those returns found to be in error during processing are transferred to a disk file. Audit room personnel have direct access to this disk file via IBM 2260 CRT terminals, on line to a System 360/50.

When information from a group of returns is placed on the disk, the computer reviews it and loads all indicated errors on tape. Along with each apparent error, it copies from the return in question any information that may be useful in researching the error. It separates the errors into data type, which can be corrected by clerical personnel, and audit type, which can only be corrected by qualified auditors.

Clerks examine the returns that are data error suspect. Typical errors of this type are missing or incorrect name and address

information, Social Security numbers or alphabetic information in numeric field. Using a display terminal, clerks transmit corrections to the computer.

The auditors research the indicated audit-type errors. These may be any of a variety of procedural or calculating mistakes — for example, an error in totaling income, in amount of standard deductions allowable, in computing tax or in type of return filed.

Auditors enter the auditing corrections through display terminals, proofreading them on the display screen before sending them to the computer. The computer then reprocesses the return.

Each night the corrected tax returns, along with new error-free returns, are processed through the remainder of the system — including computer printing of the refund checks.



The audit room where taxpayer filing errors are corrected.

During processing, the computer checks whether the taxpayer is delinquent for any prior tax liability. If so, the delinquent account is satisfied before the check is released. Since 1968, such com-

parisons against delinquencies going back to 1956 have yielded over \$1,250,000.

The new system has achieved a remarkable increase in throughput. With the

(Continued on Page 28)

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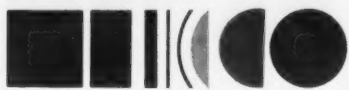
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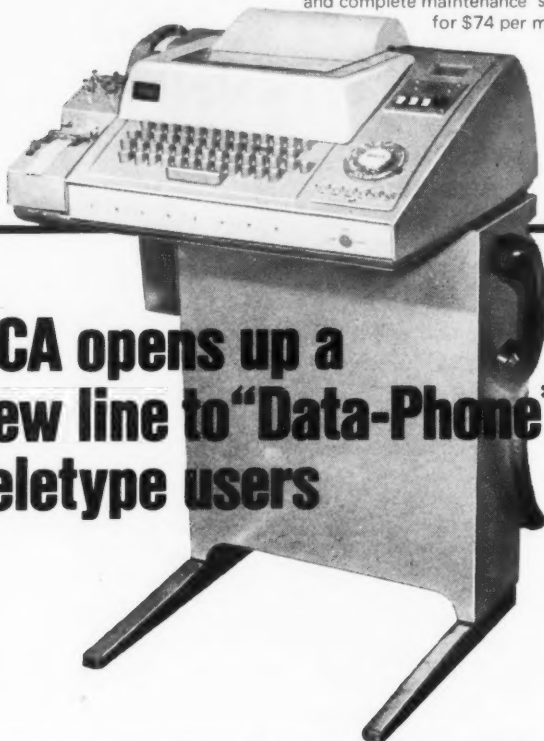
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Computer Model to Aid School Planning

STAMFORD, Conn. — A computer-based, long-range planning model is designed to help Stamford public school administrators manage their schools more effectively.

The model, to be used in a pilot program, was developed by the Norden Division of United Aircraft in Norwalk, under contract to Project Spread (School Progress Reaches Each District), a non-profit educational organization.

With the Norden General-Purpose Simulation System (GPSS) Norden stores information about

the schools in the 360/67 at National CSS, a time-sharing facility in Stamford.

Long-Range Planning

The model will enable the Stamford administrators to manage their system over both a short- and long-range time period by anticipating changing conditions and determining their effects before they occur.

For example, the computer model would help in planning classroom and teacher requirements well in advance and could help to identify budget and

other monetary problems.

The Stamford administrators will know at any given time such information as grade enrollment, course enrollment, staff needs, revenues, financial needs and facility needs.

The computer model will permit its users to study alternate routes in school programs, compare costs of new programs and compare various alternatives over a set of five-year projections, according to Dr. Thomas Reardon, Stamford's assistant superintendent of schools for instruction.

Terminals Speed Checks, Tax Processing

(Continued from Page 27)

previous card system the audit room was making between 3,000 and 4,000 corrections a day, but when the cards were recycled only about half would clear.

Now, with between 4,000 and 5,000 corrections made daily, each correction is "talked through" to a conclusion, and processing of virtually all returns involved is completed in a 24-hour cycle. Only a few special problem cases — seldom more than 25 or 30 — fail to clear the nightly production processing.

Auditors Like It

One of the satisfying aspects of the new system was the readiness with which the auditors adapted to it. Phaseout of the old system to complete on-line operation of the new took only three days.

Good training and the speed, skill and coordination gained from experience mainly account for the year-to-year forward strides in efficiency. In 1968 — the year before we began using the CRT terminals — all returns were not cleared until Dec. 31. In 1971 the entire tax return processing was "clean" by July 16.

A special feature of the Maryland system is the use of our computer to enable the bank to use its own computer to balance our refund check accounts.

Special Fund

From the comptroller's viewpoint, not the least of the virtues of the tax processing system are its demonstrated cost savings. Since we pay the DP Division for the work performed in checking tax returns, we have a direct measure of the savings achieved. Prior to the present system, error return correction costs averaged 30 cents a return. Now it's

down to about 11 cents a return, and the trend is still downward.

B.F. Marsh joined the Income

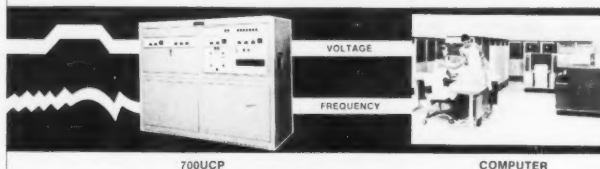
Tax Division of the state comptroller's office in 1937 and is now chief of the division.

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Do you make these mistakes when job hunting?

UNNECESSARY MISTAKES

Many Computer Professionals have the intelligence, experience, and aggressiveness to move forward and obtain higher salaries, more challenging positions, and more rewarding lives . . . but fail to do so. Why? In most cases, it's not because they haven't tried . . . but because they don't know how to find these career-turning opportunities. What is the reason so many of us are deficient in the ways of job hunting, and find our careers stunted in consequence? Why do some write their own resumes, while others use professional services with little difference in results? Why do some rely solely on employment agencies, while still others do their own job searches . . . with few resulting success stories?

The reason for the deficiency is clear.

"Most Computer Professionals do not find career-turning opportunities simply because they lack COMPREHENSIVE JOB COMMUNICATIONS."

THOUSANDS OF OPPORTUNITIES

Employment agencies and search firms just do not cover the majority of the opportunities available. Many companies are just unwilling to pay employment fees . . . especially in times of high unemployment. How then, does an individual with limited resources get extensive job communications if not through an employment agency?

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Only 63¢/week

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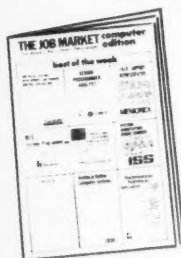
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'People' Problems Plague Data Base Management

NEW YORK — Many of the major technical problems have been resolved in the establishment of a large data base system. The important issues that remain are organizational or "people" problems, according to a recent Diebold Research Program study on data base management.

For many companies the "total integrated common data base approach of the 1960s has turned out to be a dramatic mistake. The concept involved a top-down design methodology embracing every information need conceivable. This technique has fallen generally into disfavor as organizations found it difficult, if not impossible, to implement," the study finds.

The data base concept recognizes that decisions are inter-related and must draw upon information traditionally stored in a file or a set of files; it is a collection of data which can be logically structured to provide flexibility and allow different users to have access to the information stored in it.

For a company that wants to make maximum use of its data base, the study establishes certain guidelines, including:

- The data base should serve

the functions of a business and not be patterned after organizational structures.

- Data base planning and coordination must be centralized for consistency of development efforts and cost-effectiveness control. EDP is a corporate resource and must support the entire corporation — not only one or a few units.

- Top management backing is the most important factor in gaining acceptance of any data base proposal and implementation. To gain management support, the study suggests:

- EDP must prove the benefits to be derived.

- Management autonomy should not be diluted.

- Confidentiality of data should be maintained.

- Management participation in the development of a data base system should be encouraged.

- Funding for the data base can be divided so that: development is financed on the corporate level; operation and applications on the division level and shared, where appropriate, among divisions and top management.

- Responsibility must be shared between user organiza-

tions and the EDP organization.

The trend toward centralized key files within a functional area will continue in order to provide management with a consolidated and consistent information base. A natural concomitant of this trend is the isolation of data-related functions common to most applications; these are then implemented in a generalized

fashion so that they are nearly "application-independent," the study points out.

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MUNICH — A computerized astrological counseling service is being offered to the public by a technical institution here.

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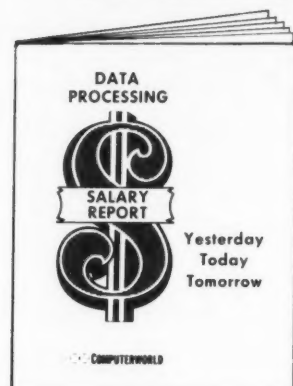
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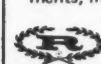
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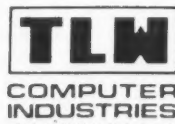
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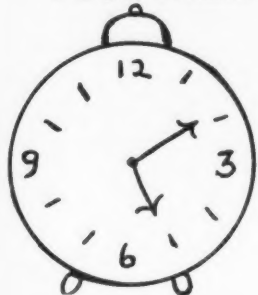
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computer industry

a Computerworld news section about the nation's fastest growing industry

April 19, 1972

Page 35

CI Notes

Fewer DP Mergers?

CHICAGO — The computer service industry showed a high percentage of divisional sales, but a decrease in merger activity during the first quarter of 1972 compared with the same 1971 period, according to a report by W.T. Grimm & Co., financial consultants.

UK Terminal Market Slowing

LONDON — The UK market for terminal equipment will continue to expand, but at a slower rate than in recent years, according to a study by Logica Ltd. The majority of the terminals delivered within the next three years will be to existing installations, particularly those which already have terminal equipment, the report says.

Honeywell 6000 Month Early

PHOENIX — Honeywell delivered its first Series 6000 computer system purchased under its World Wide Military Command and Control System (WWMCCS) contract a month ahead of schedule. The system, the first of nine slated for delivery this year under the \$51.3-million contract is now being installed at the Strategic Air Command's headquarters at Offutt AFB, Omaha, Neb.

The shipment was made less than a month after Honeywell dedicated a new \$5-million computer facility at Phoenix specifically designed for WWMCCS contract support.

Pertec Plans Products

LOS ANGELES — Pertec is readying three new OEM products to be released in May, according to a company source.

The company can be expected to concentrate its efforts in the area of disk drives in accordance with its stated plan to become the principal OEM supplier of disk devices, the source indicated.

Supershorts

Hewlett-Packard, which was expected to be the largest exhibitor at the Spring Joint Computer Conference, has dropped out of the show. HP had reserved over 20 booths.

IncoTerm Corp. has established IncoTerm Ltd., a subsidiary, to handle marketing and maintenance for the UK and Scandinavia.

Inforex, Inc., has shipped its 1,000th key-to-disk system.

A network of dealerships in the computer industry has been established by Appalachian Computer Services, Inc., a London, Ky.-based computer services group. The dealers will market a packaged or preprogrammed in-house system built around the Westinghouse 2500 to meet the requirements of medical group practices, small medical clinics and small independent banks.

Ampex Corp.'s Computer Products Division has established a new field engineering department to improve customer service. Richard T. Quast, a veteran field service manager, has been named to head the new department. The new field engineering department now includes two sections: field support and customer engineering.

West Coast Scene

Firms See Business Pace Quickening

By Marvin Smalheiser
Special to Computerworld

LOS ANGELES — The West Coast computer industry is beginning to recover from the recession and some companies are even starting to smile at the thought of business in the last half of 1972.

After two years of doldrums, most companies surveyed by *Computerworld* indicated they are at least cautiously optimistic about this year and most feel a turnaround, however modest, is underway.

West Coast businessmen surveyed by Prudential Insurance Co., also said they were more optimistic about the future than they have been in nearly 20 years.

At Xerox Data Systems, a spokesman said there are "several encouraging points that have been developing and orders are up over 1970.

"Orders received from major corporations and institutions whose future computer needs should be substantial have been particularly encouraging," he said.

E.W. Green, president of the Computer Products Division of Electronic Memories & Magnetics, reported a steadily increasing order rate. "We do find people spending money a little easier. There is no

boom but definitely an upturn."

'Not a Boom But Bright'

"I think it a steady uphill thing. It is not a boom but it is bright. We expect to meet and exceed business plans. We hit a low point and are very much on the upswing.

William R. Hoover, president of Computer Sciences Corp., said he thought business attitudes in general appear to be more optimistic and business will pick up soon.

"The time-sharing network services industry will reestablish itself as the most rapidly growing segment of the computer-based information industry," he predicted.

Tom O'Rourke, president of Tymshare Inc., said there has not been a striking improvement in sales or revenue yet, but "there is a general air of optimism in various industry groups we deal with which would seem to indicate people are beginning to think growth again."

He expects "real improvements in the third and fourth quarters."

But Paul W. Williams Jr., president of Boothe Computer Corp., is not one of the optimists.

1973 Tour Detailed

Computer Caravan Plans Encore

NEWTON, Mass. — The Computer Caravan, which ends its first tour in Detroit next week, will hit the road again next year.

The spring 1973 Computer Caravan will start in Washington, D.C., in February and end in Boston in May. The other stops will be in Miami, Houston, Los Angeles, San Francisco, Chicago, Detroit and New York.

In each city the caravan, sponsored by *Computerworld*, will present a three-day program of user forums, panels and workshops, and an exposition of computer equipment and services.

The 1973 commitment is based on the favorable reception given this year's tour by attendees and on the exceptional sales success achieved by exhibitors, according to Neal Wilder, caravan vice-president, marketing.

Attendance this spring is expected to top 25,000 he said. Despite the large number, he said, the quality in terms of corporate position and buying power has been extremely high.

Attendance Breakdown

The attendance breakdown shows that 45% have been corporate officers and/or managers and directors of data processing, 25% senior DP staff personnel, 20% management and technical personnel from the computer industry, and the remaining 10% consultants, educators, salesmen and others, Wilder said.

Exhibitors reported more than \$8 million in sales to attendees by the end of the first three stops, Wilder said, and total sales might exceed \$20 million. There are 35 companies using 50 booths on the current tour, he said.

Wilder attributed the sales success of the exhibitors to the fact that attendees were able to meet local sales and service personnel. In effect, sales calls were made right at the booth, he said.

"We are especially pleased that virtually all of our current exhibitors have indi-

cated an intent to participate in the spring 1973 tour," Wilder said. "Many of them are doubling or tripling their current booth commitment."

"User evaluation of the forum program has been very positive," said Edward J. Bride, coordinator of the Computer Users' Forums. He said attendees have described the program as "refreshing" and "highly informative."

"The Computer Caravan was conceived as an added service for our subscribers and advertisers," said Patrick J. McGovern, CW publisher and caravan president. "We wanted CW's readers to have the opportunity to exchange ideas on increasing the effectiveness of their DP operations."

"We also wanted to assist our advertisers by giving their sales and service personnel in each of the cities the opportunity to demonstrate their products and services to local executives and managers."

Controller Handles 'Any' Device

By Frank Piasta
Of the CW Staff

CHERRY HILL, N.J. — An intelligent controller that can be microprogrammed for controlling disk drives and functioning as a front-end processor has been developed by Peripherals General, Inc. (PGE) for the OEM market.

The PGI 844 Universal Controller can be interfaced with any major manufacturer's CPU and used to control peripherals of any kind, including card equipment, tape drives and printers, the company said.

Microprogrammed ROM

The device uses a microprogrammed ROM to provide its logic. Factory programming allows the incorporation of built-in automatic tests for media quality before use.

The current version of the controller is

He sees no sign of an improvement in the leasing business unless IBM is brought to task for its long-term contracts offered to users last summer. He called the contracts equal to a 30% to 35% rental degradation.

The West Coast computer industry will be a weak industry if it tries to compete with products of IBM, he said.

Dr. Robert E. Fagen, president of Computer Communications, a communications systems company, said the data communications and message-switching business his firm is involved in is "really taking off."

By contrast, he said the mainframe business is still sluggish with no upturn visible.

He emphasized that the computer industry, except for data communications, is not recovering as fast as the rest of the economy and the mainframe and plug-to-plug peripherals sales are lagging because of competition.

Erwin Tomash, chairman of the board of Data Products, is cautiously optimistic. "The worst is over," he said.

"We're not seeing an upsurge, but there certainly is no downturn. It is a healthier business than we've had," he said.

Thomas L. Ringer, president and chief executive officer of Computer Machinery Corp. is "very, very optimistic" in his outlook.

At Varian Data Machines, Angus McLagan, product manager, said business is looking up. "Customers are sounding a lot more optimistic as a group," he added.

David Methvin, president of Computer Automation Inc., which is strictly OEM, said there has been an increase in sales since last September and the greatest growth areas have been industrial control, data processing and communications.

Ray Sanders, president of Computer Transmission Corp., a data communications company, said there has been a definite upswing, starting in September.

"People are still very cautious and worry about money and they scrutinize costs carefully. Also, the cycle time between initiating and closing a sale is no longer than during the heyday of the industry. But the market is coming back pretty good. I expect it to continue through the rest of the year."

programmed to be compatible with IBM 360 and 370 systems. Under development are versions to match the GE 415 and the RCA Spectra series.

The 844 can also be configured to replace an IBM 3803 tape controller or to serve as the controller in an off-line magnetic tape-sorting system, PGI said.

The 844 incorporates 12 circuit cards, which can be changed in the field to modify the controller characteristics. It is contained in a box 14 in. by 14 in. by 10 in., allowing placement in many equipment cabinets, the company said, reducing floor space requirements.

Unit prices vary from about \$6,000, for a configuration to be used with a mini-computer, to over \$25,000 for connecting a large data base, such as the IBM 3330, to a large-scale computer. Delivery is 30 to 60 days from Cherry Hill Industrial Park, 08003.

Foxboro Low-Cost Process Control Unit Offers Use of Plug-In Function Cards

FOXBORO, Mass. — The Foxboro Co., long a proponent of pneumatically controlled process control systems, is edging further into the electronics area with its introduction of the Spec 200 process control system.

Priced to compete favorably with pneumatics, the Spec 200 will cost about 20% to 30% less in a system with from 500 to 1,000 loops, according to Bruce

cent/bit in quantity.

Other New Products

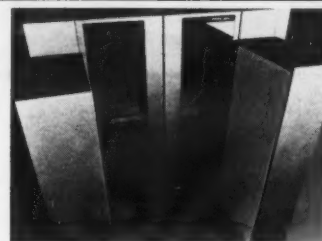
Microdata, Santa Ana, Calif., has made its general-purpose I/O controllers available for use with Micro 800 and Micro 1600 mini-computers.

The Custom Video Terminal 500 from Liberty Systems Group, Canoga Park, Calif., a 72-character, 12-line display with keyboard offers answer-back, lower case, blink, field re-

verse and tab controls, remote batch operation and is priced at \$1,450 in unit quantity.

Called the world's smallest core stack, the memory stack from United Telecontrol Electronics Corp., Asbury Park, N.J., is less than half the size of the next smallest available stack.

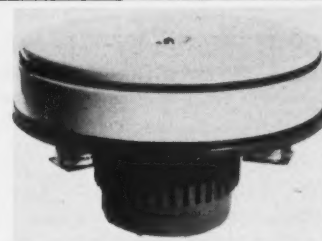
Ensco, Inc., Springfield, Va., is producing its all-digital filter for computer peripheral or stand-



Foxboro Spec 200

alone applications in conjunction with a small processor, the Model 1008, said to reduce computation time while maintaining the versatility and flexibility of software.

International Data Sciences,



Tally 128-Track Disk Memory

Providence, R.I., has introduced its Data Patch and Monitor Panel of modular construction that provides switching capability for each channel at the multiplexer and communications computer interface. P and M modules are priced at \$260; drive and power modules sell for \$300.

New OEM Products

H. Baldridge, manager for corporate market and product planning.

The greatest part of the cost savings in the Spec 200 will lie in the area of lower cost panel design and reduced wiring and installation costs, the company said.

The cost of reconfiguring the system will be reduced by the use of plug-in function cards, Foxboro said. Disturbance is kept to a minimum by the use of a parallel wiring system.

The Spec 200 may be separated into two areas: the display area which contains manual stations, recorders and indicators to provide operator displays and controls; and the nest area with the analog control, computing, alarm, signal conditioning and I/O signal converter units.

The company's Fox 1 and Fox 2 computers can be attached to the Spec 200 through the Inter-spec interface, allowing the use of standard software, according to Foxboro.

Tally 128 Track Disk Shown

KENT, Wash. — An expanded 128-track version of the Tally disk series, with storage capacity ranging from .56- to 8.96 Mbits, has been announced by Tally Corp.

The expanded memory unit offers 70,000 bit/track and a 2.1 Mbit/sec transfer rate. Access time is 17 msec. Unit cost starts at 8 cent/bit per unit, less than 6

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Recycling a Plus for Tape Firm

GRAHAM, Texas — The installation of a computer-monitored air-pollution control system will not only contribute clean air to the surrounding environs, but also provide Graham Magnetics with solvents for reuse.

The new control system removes at least 95% of all contaminants from the air stream vented by the tape production process, according to George Jagers, president.

When a carbon bed is loaded with wastes, a computer control system switches it out of the air flow and replaces it with a fresh carbon bed. The loaded bed is cleaned with blasts of steam that dissolve the hydrocarbons. The water/hydrocarbon solution is then distilled in several steps to remove the water and provide nearly pure solvents for reuse in the plant.

Officials expect the installation will pay for itself within 18 months. After the basic period, the system will contribute to the firm's profits, officials explained.

CDC Lands \$83 Million Air Force Pact

MINNEAPOLIS — Control Data Corp. has landed a seven-year contract valued at \$83 million to provide one medium- and six large-scale computer systems for the Air Force's Advanced Logistics System (ALS).

Control Data and Univac were the only final bidders for the award. IBM had launched a pre-award protest with the General Services Administration over a limit on implied warranties and damages charged to computer-related errors, and said it was unable to submit its "final and most favorable offer."

The new computers will replace about 90 computer systems currently used by the Air Force Logistics Command (AFLC). By facilitating implementation of advanced manage-

Contracts

ment techniques, the ALS is expected to result in savings in excess of \$100 million over the life of the system compared to the current method of operation.

The award provides options for addition purchases.

Hewlett-Packard has awarded contracts to International Computer Products, Inc. for digital cassette tape transports and to Dicom Industries for a cassette magnetic tape system.

The digital cassette tape transports, Digidecks, will be incorporated into a bulk storage peripheral for the 9800 Series programmable calculators. The Dicom 344 cassette will be used in the HP system console.

National Data Corp. is leasing 300 teletypewriter units and associated peripheral equipment from the RCA Service Co., and 100 minicomputers from Honeywell. The minis will be used in a credit card checking system in the U.S. and Canada; the teletypewriters in a reservation system serving the Quality Court Motel chain.

Data Motivation Inc. has signed a marketing consulting agreement to aid Digi-Data Corp. in the planning and development phases of its new OEM marketing effort.

Cybermatics has received a \$213,000 contract for implementing a Fully Automated Switched Telecommunications Network (Fastnet) at Continental Grain.

Ampex has received a contract to supply core memory stacks to Modular Computer Corp., Fort Lauderdale, Fla. The award exceeds \$400,000.

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Aussies Split on CRT Tariffs

Special to Computerworld

SYDNEY, Australia—The outcome of the Tariff Board inquiry into tariff protection of local CRT terminal manufacturers is expected to strongly influence the development of local manufacturing facilities in the computer industry.

Currently there is a general duty of 7.5% on computer equipment, preferential free, while an additional temporary duty of 25% has been imposed on CRT terminals.

Of the Australian manufacturers seeking protection, Information Electronics is asking a general duty of 47.5%, preferential 40%, Amalgamated Wireless Australia Ltd., a general of 45%, preferential 35%. Investment Enterprises requested a general duty of 125%.

Overseas manufacturers and importers of equipment such as Univac, IBM, Tektronix, Burroughs, Digital Equipment, Control Data, Honeywell and ICL are opposing the application, as are the users, represented by the Australian Computer Users' Association, Qantas and Trans Australia Airlines.

H.J. Kidd of Qantas said that taking into account freight, insurance, duty at 7-1/2% and sales tax, computer equipment already costs 25% more than it did in the U.S. and this placed Australia at a competitive disadvantage. Increased duty would be a further burden without giving any increase in productivity, he said.

DPers Seek Answers to Export Rulings

By Bohdan O. Szuprowicz

Special to Computerworld

JERICO, N.Y.—Since 1970 the export control office of the U.S. Department of Commerce has "decontrolled" about 1,800 item categories for trade with the Soviet Bloc countries, and the trend continues, according to Rauer H. Meyer, director of the Office of Export Control of the U.S. Department of Commerce.

About 20 industry representatives tried to obtain some explanations regarding licensing procedures of U.S.-made goods sold to the Soviet Bloc at a recent meeting here with Meyer and Lioubin Korliakov, commercial counselor of the USSR Embassy.

Encourages Trade

Meyer pointed out that the U.S. Department of Commerce specifically encourages trade with Eastern Europe and intends to reduce existing controls even further. But most of the remaining controlled categories represent sensitive areas, such as those with inherent military potential, which includes computers.

The Export Control Office can be approached to

speed up licensing procedures in specific cases if the applicant can support his case with documentation such as an expiring letter of credit or a budgetary cutoff date from a socialist foreign trading organization, Meyer said.

The Department of Commerce recognizes the rigidity of the planned economies and is willing to help out those trying to do business there, he added.

Korliakov, the commercial counselor from the USSR Embassy in Washington, said the level of U.S.-Soviet trade could reach \$5 billion in a few years if all restrictions were removed.

Charles Barry, vice-president of Comdisco, a used computer and leasing firm, sought some answers why his application for a temporary license to exhibit a used IBM 370/145 at the "Computers 72" show in Moscow next May was denied.

After the very successful business machines exhibition in Leningrad last October, when an IBM 360/50 was sold to the Russian Ministry of Chemistry, IBM World Trade said it was also ready to sell 370/135s and 145s to the Soviets.

An IBM 370/145 is also on order from Zowar, a Polish national computing services organization which is installing an IBM 360/50 in Warsaw to start Poland's first time-sharing center. It is not known if any of these machines are licensed for export yet, but the Poles have announced the 360 time-sharing center in their own press.

Not Hooked Up

Meanwhile, in Russia the IBM 360/50 which remained there after the Leningrad show cannot be hooked up because final approval has not been given by Washington.

Dr. Carl Hammer of Univac, who recently toured several Russian cities at the invitation of the Russians, estimates the Soviet Union already has between 5,000 to 6,000 computer installations valued at \$1 billion. Current five-year plans indicate a possible tripling of this capacity by 1975.

Korliakov presented a shopping list of commodities which Russia would like to buy in the U.S. including computers and technology know-how. He also indicated that trade between the two could develop much faster if the U.S. would buy more Soviet products such as small jet aircraft, oilfield equipment, optical and medical instruments and not just raw materials.

Opportunities Exist

There are opportunities for flexible computer dealers willing to arrange triangle deals by taking Soviet Bloc industrial manufacturers and finding markets for them, perhaps in developing countries, noted Comdisco's Barry.

Another attendee, Daniel McGlynn, a broker and venture capital expert specializing in computers and technologies, pointed to the "contract manufacturing" possibilities in the Soviet Bloc countries as a means of selling to dollar-short buyers there.

The "Computers 72" exhibit in Moscow, which will run from May 23 to June 1, reflects the eagerness of U.S. computer and peripherals manufacturers to start competing openly with Western European companies that have been doing business in Russia for some time. Participants include: Itel, Control Data, Calcomp, Hewlett-Packard, Memorex, Digital Equipment, Sycor, Kybe, Nuclear Data and Data General.

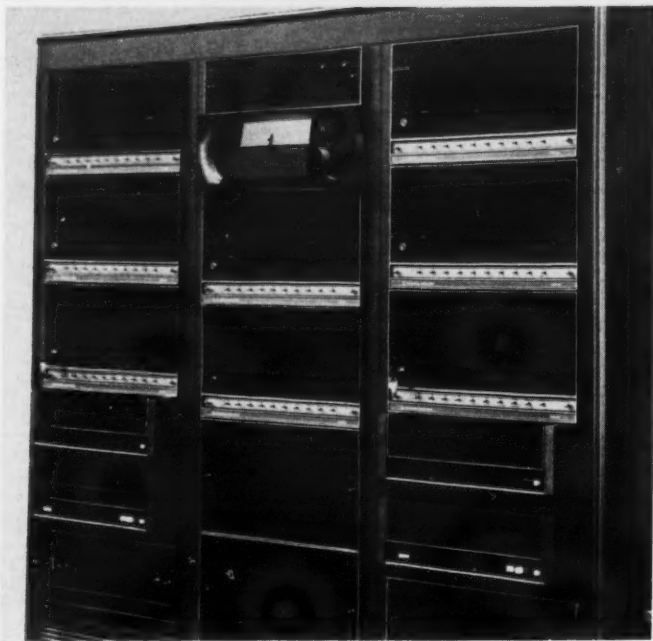
Arne Krabbe, president of International Media & Exhibits, which is organizing that show, is negotiating in Washington to get President Nixon, who will be in Moscow at that time, to make an appearance at the show.

Some computer and peripherals makers are already working on the assumption that export controls will be eased as a result of Mr. Nixon's talks with the Soviet leaders and computer sales to the Soviet Union will increase sharply.



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EDP needs

72 sjcc



8 Minis in One

One of the largest minicomputer configurations ever shipped by Data General Corp., a system made up of eight interconnected Nova 800s, 152K words of core memory and almost 5M words of disk storage, has been delivered to General Electric Space Division in Daytona Beach, Fla. The system will drive 40 stations used to train U.S. Navy flight officers.

MIT Honors DP Pioneer Forrester

CAMBRIDGE, Mass. — Prof. Jay W. Forrester, the MIT scientist who invented the memory device that makes digital computers possible and then turned his computer expertise to management and systems dynamics, has been appointed Germeshausen Professor at MIT commencing with the 1972-73 academic year.

The Germeshausen Professorship was established in 1968 and is intended to support MIT's interests in combining humanitarian advances with technological progress.

Forrester invented, and holds the basic patent for, random-access, coincident-current magnetic storage.

CMC Moves to Acquire Keylogic Units

LOS ANGELES — Computer Machinery Corp. (CMC) is moving to acquire some Keylogic equipment currently on rental from Transamerica Computer Co., which acquired title to the equipment from Redcor Corp. Redcor recently filed a

Bankruptcy Act petition.

Under terms of the proposed transaction, CMC would enter into a long-term contract to service the equipment being purchased by the Transamerica unit. CMC intends to acquire the existing Keylogic service organiza-

tion if the agreement is finalized, the company said.

Negotiations involve the sale by CMC of about \$12 million of equipment to Transamerica for \$7 million and other considerations. The equipment includes a variety of CMC data entry products that carries a monthly rental rate of about \$195,000.

In addition to paying the \$7 million, Transamerica would transfer to CMC some Keylogic data entry equipment currently on lease with monthly rentals of about \$140,000.

Orders & Installations

The European Company for Propulsion has ordered a Univac 1106 and associated equipment for use in processing technical and scientific calculations as well as handling business-oriented applications.

Computer Corp. of America has purchased a Digital Equipment Corp. Decsystem-10 which will become the central data handler resource of the Arpanet, a nationwide computer network that links universities and research computer centers.

First Union National Bank, Charlotte, N.C., has selected Computer Wares, Inc.'s Automated Retail Accounts Receivable System, Areas II, to process merchant charge cards and private accounts.

The Mount Sinai Hospital of New York has ordered Hospact, Information Equities' patient accounting system, for use on its IBM 370/145.

The Wiremold Co., W. Hartford, Conn., has installed a Burroughs B2500 for production and inventory control. The

system will also be used to forecast market demand fluctuations.

The Office of the Auditor of Public Accounts of the State of Illinois has installed a Burroughs B3500 to handle auditing of all state vendors, including disbursements of state agencies.

Biochemical Procedures, Inc. has leased an ECM-50 memory, a DS-314 disk system and eight TM-1624-V tape drives from Ampex.

Expert Network Graphics Systems have been installed at Litton Systems, Inc., Van Nuys, Calif., and Texas Instruments Inc., Dallas. Litton will use the system for its DD963 Destroyer program for the Navy.

The University of Bergen, Norway, has ordered a Univac 1110 system for student instruction, scientific research programs and administration.

Paine, Webber, Jackson & Curtin, Inc. will lease 800 desk-top quotation terminals from Ultronic Systems Corp.

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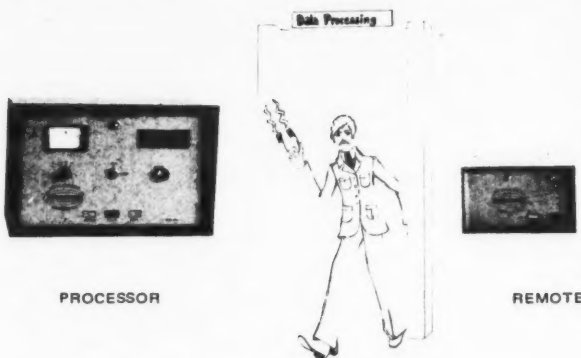
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Inforex Plans Profitable Year

By Molly Upton

Of the CW Staff

BOSTON — With the establishment of a new leasing company, 10 overseas distributorships and accrual of lease revenues combined with anticipated growth in the key-to-disk market, Inforex expects to be profitable in 1972.

Addressing the firm's second stockholders meeting here, President Thomas B. Horgan said restated revenues for the year

ended Jan. 2 more than doubled, to \$791,585 from last year's \$327,246. Losses were stable, at \$4.1 million, or \$3.27 per share.

The 1971 loss includes a \$550,000 extraordinary charge reflecting the discontinuance of Infobond Corp.

A new leasing company, Inforex Leasing Co. II, has been established with the same principles involved in Inforex Leasing I, with no equity on the part of Inforex. Under this arrangement, sales to Inforex Leasing Co. II are recorded on the books as sales. The firm has changed to the operating method of accounting and is deferring income from Leasing I.

As of Jan. 2, Inforex had an estimate of \$4.4 million in net deferred income from these sales, including the notes and accrued interest receivable.

Distributorship sales will also be recorded as sales.

The marketing target for 1972 is to obtain 50% of the installed

base of keystations, Horgan said. Estimates indicate an incremental growth in the U.S. market of 12,800 keystations per year.

In the first quarter of 1972, Inforex saw the best order rate in its history.

Keystation Backlog

As of the end of 1971, there were 5,500 keystations installed, with a backlog of 1,555 stations. Horgan noted that manufacturing costs have continued to decline.

When questioned about competitive price cutting, Horgan said Inforex didn't expect to be affected. He added Inforex gets about 70% of bids it engages in, with about 50% of business coming from its installed base.

Before the end of the year, Inforex will have a new product, which will expand the company's identity to something more than key entry, he said.

ADR Posts '71 Loss, Improved 4th Period

PRINCETON, N.J. — Fourth quarter continuing operations were profitable at Applied Data Research, Inc., but not enough to prevent a loss for the year. On revenues from continuing operations of \$6.7 million, ADR posted a \$384,333 loss for the year ended Dec. 31.

But a \$66,000 special item, a gain on partial redemption of convertible debentures, more than offset an additional loss of \$33,318 from discontinued operations, for a year-end loss of \$351,651, or 36 cents a share.

Pertec Sales, Earnings Rise in Second Period

LOS ANGELES — Pertec Corp.'s increased sales and earnings in the second quarter were attributed to the continued sales growth of the firm's business systems and peripheral equipment divisions.

In the period ended Dec. 31, revenues rose to \$6.1 million from \$5.2 million in the same 1970 quarter. Earnings rose to \$570,000 or 18 cents a share compared with \$443,000 or 15 cents a share.

Nickels & Dimes

Mohawk Data Sciences is negotiating the sale of \$10 million of senior subordinated notes to an institutional investor, and is considering restructuring its bank lines to provide additional amounts of bank financing. The financing will be used for the firm's rental programs.

\$\$\$

Cybermatics has modified the payment terms of its acquisition of Trade Mark Service Corp. Under the new plan, 161,373 shares of stock dilution are eliminated and additional payments are tied to the profits of Trade Mark.

\$\$\$

Fabritek has completed arrangements for a new line of bank credit, consisting of \$5 million for lease financing, up to \$2.1 million open line for domestic operations, and \$260,000 for overseas operations.

\$\$\$

About 28% of Western Union Telegraph's 1971 operating revenues came from leased systems and related services. Revenues from Infocom, a time-sharing system, were

16.5% higher than in 1970.

\$\$\$

Pitney Bowes share of total deferred development costs in Pitney Bowes-Alplex as of December, 1971, had increased to \$5.1 million from \$1.8 million a year ago. Pitney Bowes-Alplex makes the Spice point-of-sale system.

\$\$\$

Telex has lined up its financing program to accomplish the transition from selling "virtually all" DP "equipment to independent leasing companies to retaining full ownership of all such equipment." Telex has received or "has firmly available" \$125 million and anticipates having \$63.5 million available from warrants and additional DP sales.

\$\$\$

I.O.A. Data Chairman Stuart Rubenstein told stockholders he views the rest of fiscal '72 "with cautious optimism." He noted recent currency revaluations should have a favorable effect on the firm's export business, which accounts for almost one-third of the company's sales.

Earnings Reports

ELECTRONIC MEMORIES & MAGNETICS

Year Ended Dec. 25

	1971	a1970
Shr Ernd	b	.....
Revenue	\$75,016,000	\$75,387,000
Loss Disc		
Op	908,000	3,062,000
Spec Chg	d9,572,000	e964,000
Loss	8,510,000	14,257,000

a-Restated to reflect discontinued operations. b-Preferred dividend requirements exceeded income. d-Debit; includes \$7,172,000 writeoff of loan made to Semi-Conductor Electronic Memories Inc., and establishment of a \$3,800,000 valuation reserve against loans made to Document Sciences Corp. and Zehntel Inc., less \$1,381,000 tax credit. e-Writeoff of investment in Multi-Access Systems Corp.

APPLIED DATA RESEARCH

Year Ended Dec. 31

	1971	a1970
bRevenue	\$6,744,173	\$6,663,411
Loss Disc		
Op	33,318	135,664
cSpec Cred	66,000	77,000
Loss	351,651	226,646

a-Restated. b-From continuing operations. c-Represent net gain on partial redemption of convertible debentures.

TAB PRODUCTS

Three Months Ended Feb. 28

	1972	1971
Shr Ernd	\$.21	\$.08
Revenue	5,080,000	4,127,000
Earnings	173,000	68,000
9 Mo Shr	.47	.50
Revenue	13,350,000	13,401,000
Earnings	396,000	420,000

DATA TECHNOLOGY

Three Months Ended Jan. 30

	1972	1971
Revenue	\$2,808,000	\$2,701,000
Loss	159,000	99,000
9 Mo Rev	8,987,000	8,906,000
Spec Cred	142,000	.....
Loss	3,000	1,036,000

DIGITAL APPLICATION

Three Months Ended Jan. 31

	1972	a1971
Shr Ernd	\$.01	.....
Revenue	204,944	\$52,280
Earnings		
(Loss)	12,970	(138,598)
9 Mo Rev	534,378	341,119
Loss	57,665	255,855

a-Restated.

TYMSHARE

Year Ended Dec. 31

	1971	1970
aShr Ernd	\$.07	\$.03
Revenue	12,519,859	10,233,113
Tax Cred	162,000	44,000
bEarnings	365,275	98,709

a-Based on income before tax credit. b-Equal to 13 cents a share in 1971 and 5 cents a share in 1970.

OPTICAL SCANNING

Three Months Ended Dec. 31

	1971	a1970
Revenue	\$2,305,085	\$2,131,665
Loss	714,121	918,608
6 Mo Rev	4,510,078	4,066,737
Spec Chg	.....	b8,640,639
Loss	1,216,016	10,453,747

a-Restated to reflect change in accounting principles. b-Cumulative effect of changes in accounting principles.

RCA

Year Ended Dec. 31

	1971	a1970
(000)	(000)	(000)
Shr Ernd	b\$1.20	\$1.16
Revenue	3,544,998	3,340,271
Loss Disc		
Op	34,496	16,032
Spec Chg	d250,000	.....
Earnings		
(Loss)	(155,850)	91,349
3 Mo Shr	.42	.52
Revenue	984,519	949,059
Loss Disc		
Op	.....	4,030
Earnings	31,908	39,963

a-Restated. b-Based on income before special charge. d-Related to withdrawal from the general-purpose computer business.

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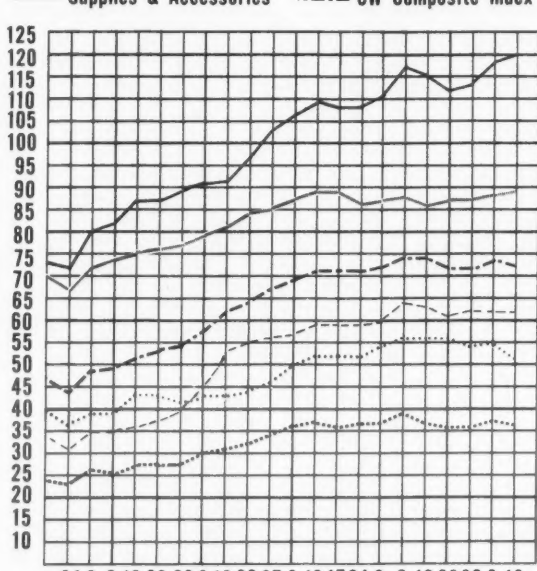
TRADE QUOTES

Computerworld

Stock Trading Summary

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CLOSING PRICES THURSDAY, APRIL 13, 1972

E X C H	PRICE				E X C H	PRICE					
	1972 RANGE (1)	CLOSE APR 13 1972	WEEK NET CHNGE	WEEK PCT CHNGE		1972 RANGE (1)	CLOSE APR 13 1972	WEEK NET CHNGE	WEEK PCT CHNGE		
SOFTWARE & EDP SERVICES											
O	ADVANCED COMP TECH	1- 2	1 5/8	0	0.0	O	GRAPHIC CONTROLS	12- 15	14 1/4	- 1/2	-3.3
A	APPLIED DATA RES.	5- 7	5 3/8	0	0.0	N	3M COMPANY	129-149	148	+1 1/2	+1.0
O	APPLIED LOGIC	1- 4	2	0	0.0	O	MOORE BUS. FORMS	42- 48	47 1/2	+ 3/8	+0.7
N	AUTOMATIC DATA PROC	72- 91	89 7/8	0	0.0	N	NASHUA CORP	48- 56	54	- 3/4	-1.3
O	AUTO SCIENCES	1- 1	3/8	0	0.0	O	REYNOLDS & REYNOLD	37- 77	43	- 1/2	-1.1
O	COMPUTER DIMENSIONS	0- 14	8 1/2	-2 1/4	-20.9	O	STANDARD REGISTER	16- 20	18 3/4	- 1/2	-2.5
O	COMPUTER NETWORK	4- 7	4 3/8	- 1/8	-2.7	O	TAB PRODUCTS CO	14- 17	15 1/2	+1 1/4	+8.7
N	COMPUTER SCIENCES	8- 10	9 5/8	0	0.0	N	UARCO	23- 28	24 1/4	- 3/4	-3.0
O	COMPUTER TECHNOLOGY	6- 8	7 5/8	+1 3/8	+22.0	A	WABASH MAGNETICS	8- 11	11	+1 1/4	+12.8
O	COMPUTER USAGE	9- 14	13 3/4	+ 1/4	+1.8	N	WALLACE BUS FORMS	23- 26	25 7/8	+ 1/2	+1.9
O	COMP AUTOMOT REPORTS	7- 9	6 1/2	- 1/2	-7.1	COMPUTER SYSTEMS					
N	COMPUTING & SOFTWARE	22- 28	25 3/4	+1 1/2	+6.1	N	BURROUGHS CORP	147-175	175 1/8	+3	+1.7
O	COMRESS	1- 3	2 1/4	+ 1/8	+5.8	N	COLLINS RADIO	14- 20	19 3/8	+1 1/2	+8.3
O	COMSHARE	5- 10	9 5/8	- 1/4	-2.5	N	CONTROL DATA CORP	43- 67	67	+4 1/2	+7.1
O	DATA AUTOMATION	1- 1	1/4	- 1/8	-33.3	O	DATA GENERAL CORP	56- 99	97	+4 1/2	+4.8
O	DATAMATION SERVICE	1- 1	5/8	- 1/8	-16.6	O	DIGITAL COMP CONTROL	13- 25	12 1/2	-3 3/4	-23.0
O	DATATAB	5- 9	7 1/4	+ 1/2	+7.4	N	DIGITAL EQUIPMENT	72- 97	79 3/8	-10 3/8	-11.5
O	EDP RESOURCES	5- 8	4 1/2	- 1/2	-10.0	N	ELECTRONIC ASSOC.	6- 13	12 3/4	+1 1/8	+9.6
A	ELECT COMP PROG	3- 5	4 5/8	+ 5/8	+15.6	A	ELECTRONIC ENGINEER.	8- 14	10 5/8	+ 7/8	+8.9
N	ELECTRONIC DATA SYS.	43- 62	61 3/8	- 5/8	-1.0	N	FOXBORO	34- 39	38 3/4	- 1/2	-1.2
O	INFORMATICS	8- 11	9 1/8	+ 1/8	+1.3	O	GENERAL AUTOMATION	13- 26	21 1/2	-2 3/4	-11.3
O	I.O.A. DATA CORP	1- 2	2 1/8	0	0.0	N	HEWLETT-PACKARD CO	46- 60	59 5/8	+2 1/2	+4.3
A	ITEL	10- 12	9 3/4	- 1/8	-1.2	N	HONEYWELL INC	130-158	153 1/2	+4 1/2	+3.0
O	KEANE ASSOCIATES	4- 7	4 3/4	+ 1/2	+11.7	N	IBM	333-398	394 1/4	+3 1/4	+0.8
O	KEYDATA CORP	7- 10	8 7/8	+ 1/2	+5.9	O	INTERDATA INC	8- 16	15 1/4	+ 3/8	+2.5
O	LOGICON	4- 9	7 7/8	0	0.0	N	NCR	29- 34	31 7/8	-1 1/2	-4.4
A	MANAGEMENT DATA	6- 9	8	+ 1/4	+3.2	N	RAYTHEON CO	39- 47	46 3/4	+3 1/2	+8.0
O	NATIONAL CSS INC	8- 16	15 3/4	+3 1/2	+28.5	N	SPERRY RAND	30- 39	34 3/4	- 1/2	-1.4
O	NAT COMP ANALYSTS	1- 1	7/8	0	0.0	A	SYSTEMS ENG. LABS	11- 16	15	0	0.0
P	ON LINE SYSTEMS INC	8- 15	13	0	0.0	N	VARIAN ASSOCIATES	14- 18	16 3/4	+ 3/8	+2.2
N	PLANNING RESEARCH	14- 17	15 1/2	+ 1/2	+3.3	N	VICTOR COMPTOMETER	15- 24	23 3/8	+2 1/4	+10.6
O	PROGRAMMING METHODS	22- 24	22	- 3/4	-3.2	N	WANG LABS.	35- 59	58 5/8	+9 5/8	+19.6
O	PROGRAMMING & SYS	1- 2	1 5/8	0	0.0	N	XEROX CORP	121-146	143 5/8	-1 1/8	-0.7
O	SCIENTIFIC COMPUTERS	3- 4	3	0	0.0	LEASING COMPANIES					
O	SIMPLICITY COMPUTER	1- 5	3 7/8	- 1/8	-3.1	A	BOOTHE COMPUTER	10- 18	9 1/2	-1 5/8	-14.6
O	SOFTWARE SYSTEMS	1- 3	1 3/8	0	0.0	O	BRESNAHAN COMP.	2- 3	2 1/2	- 1/4	-9.0
O	TBS COMPUTER CENTERS	4- 5	5 1/4	0	0.0	O	COMDISCO INC	6- 13	N/A	-12 1/2	-100.0
O	TRACOR COMPUTING	2- 3	1 5/8	- 1/8	-7.1	O	COMPUTER EXCHANGE	2- 2	2 1/4	0	0.0
O	TYMSHARE INC	7- 10	6 7/8	- 1/2	-6.7	A	COMPUTER INVSTRS GRP	8- 14	12 7/8	- 1/2	-3.7
O	UNITED DATA CENTER	5- 8	7 1/4	0	0.0	N	DPF INC	9- 13	10 3/8	- 1/8	-1.1
N	UNIVERSITY COMPUTING	19- 26	24 7/8	+4 5/8	+22.8	M	DATRONIC RENTAL	3- 4	3 1/2	- 1/4	-6.6
A	URS SYSTEMS	6- 9	8 5/8	+ 3/4	+9.5	A	DCL INC	8- 10	7 5/8	- 1/2	-6.1
O	VORTEX CORP	4- 5	5	- 1/4	-7.6	A	DEARBORN-STORM	18- 26	25	+ 3/4	+3.0
PERIPHERALS & SUBSYSTEMS											
N	ADDRESSOGRAPH-MULT	34- 42	38 3/8	- 3/8	-0.9	A	DPA, INC.	5- 8	6 3/8	- 1/8	-1.9
O	ALPHANUMERIC	1- 2	3/4	- 1/4	-25.0	A	GRANITE MGT	8- 11	9 7/8	- 1/2	-4.8
N	AMPEX CORP	8- 15	8 7/8	+1	+12.6	A	GREYHOUND COMPUTER	8- 11	9 1/2	+ 3/8	+4.1
O	ANDERSON JACOBSON	5- 8	5 3/4	- 1/4	-4.1	N	LEASCO CORP	20- 24	21 5/8	- 1/8	-0.5
O	ATLANTIC TECHNOLOGY	3- 11	7 3/4	+1 1/4	+19.2	O	LECTRO MGT INC	2- 4	3 1/2	- 1/4	-6.6
A	BOLT, BEIANEK & NEW	5- 16	16 1/4	+1 1/4	+8.3	O	NCC INDUSTRIES	8- 11	9 3/4	+ 1/2	+5.4
N	BUNKER-RAMO	9- 12	11 7/8	+ 1/8	+1.0	A	ROCKWOOD COMPUTER	4- 7	4 5/8	+ 1/8	+2.7
A	CALCOMP	19- 25	21 5/8	+1 1/4	+6.1	O	SYSTEMS CAPITAL	3- 9	9 1/8	+1	+12.3
O	CENTRONICS DATA COMP	11- 35	34 1/2	+1	+2.9	N	U.S. LEASING	36- 48	47 1/8	+1 1/2	+3.2
O	COGNITRONICS	3- 5	2 7/8	- 1/4	-8.0	EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE					
O	COMPUTER COMMUN.	4- 7	3 3/4	-2 1/4	-37.5	L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER					
A	COMPUTER EQUIPMENT	3- 4	3 3/8	- 1/4	-6.8	P=PHIL-BALT-WASH					
O	COMPUTER MACHINERY	7- 10	10 1/8	+1 3/4	+20.8	O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID					
A	COMPUTEST	6- 9	6 3/8	0	0.0	(1) TO NEAREST DOLLAR					
O	CONSOL COMPUTER LTD.	1- 1	1/2	0	0.0	Computer Stocks Trading Index					
A	DATA PRODUCTS CORP	5- 7	5 3/8	0	0.0	—— Computer Systems ——— Software & EDP					
O	DATA RECOGNITION	4- 5	3 3/4	0	0.0	..... Peripherals & Subsystems Leasing Companies					
O	DATA TECHNOLOGY	3- 5	3 3/8	- 1/4	-6.8	—— Supplies & Accessories ——— CW Composite Index					
O	DI/AN CONTROLS	0- 8	7 1/4	+ 1/4	+3.5						
O	DIGITRONICS	3- 4	3 3/8	- 1/8	-3.5						
N	ELECTRONIC M & M	6- 8	6 3/4	- 1/8	-1.8	DEC 24 9 16 23 30 6 13 20 27 3 10 17 24 2 9 16 23 30 6 13					
O	FABRI-TEK	2- 5	4 3/4	+ 1/2	+11.7	APR					
N	GENERAL COMPUTER SYS	7- 16	13	+ 3/4	+6.1						
N	GENERAL ELECTRIC	59- 70	69 1/2	- 1/2	-0.7						
N	HAZELTINE CORP	9- 13	11 5/8	+ 3/8	+3.3						
O	INFOREX INC	28- 47	46 1/2	+2 1/2	+5.6						
O	INFORMATION DISPLAYS	3- 5	2 3/4	- 1/4	-8.3						
O	MANAGEMENT ASSIST	1- 2	1 1/4	0	0.0						
N	MEMOREX	27- 38	30 5/8	+ 5/8	+2.0						
A	MILGO ELECTRONICS	17- 38	37	+2 1/8	+6.0						
N	MOHAWK DATA SCI	20- 27	25 1/2	- 1/4	-0.9						
O	OPTICAL SCANNING	7- 16	10	-1 1/4	-11.1						
O	PERTEC CORP	12- 17	13 3/8	- 3/8	-2.7						
O	PHOTON	7- 15	14 3/4	+ 1/4	+1.7						
A	POTTER INSTRUMENT	15- 21	18 1/4	+ 3/8	+2.0						
O	PRECISION INST.	7- 12	7 1/4	- 1/4	-3.3						
O	RECOGNITION EQUIP	10- 15	10 3/8	-1 1/4	-10.7						
N	SANDERS ASSOCIATES	16- 21	18 7/8	- 1/8	-0.6						
O	SCAN DATA	10- 13	9 1/2	- 1/4	-2.5						
O	STORAGE TECHNOLOGY	17- 27	N/A	-24	-100.0						
O	SYCOR INC	7- 10	7 3/4	0	0.0						
O	TALLY CORP.	8- 13	9 3/4	- 1/8	-1.2						
N	TEKTRONIX INC	34- 50	47 1/4	-1 1/2	-3.0						
N	TELEX	11- 15	11 1/2	+ 1/4	+2.2						
SUPPLIES & ACCESSORIES											
N	ADAMS-MILLIS CORP	10- 13	9 7/8	- 1/4	-2.4						
O	BALTIMORE BUS FORMS	6- 8	7	+ 3/4	+12.0						
A	BARRY WRIGHT	9- 13	12 5/8	- 1/8	-0.9						
A	DATA DOCUMENTS	17- 24	23	- 1/4	-1.0						
O	DUPLEX PRODUCTS INC	12- 16	13 1/2	-1 1/4	-8.4						
N	ENNIS BUS. FORMS	7- 9	8 7/8	+ 1/8	+1.4						
O	GRAHAM MAGNETICS	15- 27	21 3/4	+ 1/4	+1.1						

Earnings Reports

BOOTHE COMPUTER

	1971	1970
Shr Ernd	\$1.11	\$1.50
bRevenue	60,549,000	45,274,000
Loss Disc		
Op	546,000	125,000
Spec Chg	d1,091,000	.....
Earnings	c1,038,000	2,812,000
3 Mo Shr	.....	.42
bRevenue	14,973,000	13,133,000
Loss Disc		
Op	115,000	125,000
Spec Chg	d1,091,000	.....
Earnings	(1,437,000)	781,000

a-Based on income before special charge. b-From continuing operations. c-Equal to 54 cents a share. d-Written down of investment in Boothe Resources International.

TELECREDIT

Three Months Ended Jan. 31

	1972	1971
aShr Ernd	\$.05	\$.01
Revenue	1,319,444	716,502
Tax Cred	42,400	9,600
bEarnings	100,499	21,624
a9 Mo Shr	.06	.08
Revenue	3,140,875	2,041,609
Tax Cred	44,000	52,500
bEarnings	104,164	122,989

a-Based on income before tax credit. b-Equal to 9 cents a share in the quarter and 11 cents a share in the nine months of 1972, compared with 2 cents a share and 14 cents a share, respectively, in the like periods of 1971.

COMPUTER DYNAMICS

Year Ended Dec. 31

	1971	1970
Shr Ernd	\$.10	\$.63
Revenue	2,021,348	971,570
Earnings	96,691	(624,432)

KEYDATA

Six Months Ended Jan. 31

	1972	1971
aShr Ernd	\$.03	\$.01
Revenue	3,512,000	2,835,000
bTax Cred	64,000	22,000
cEarnings	140,000	51,000

a-Based on income before tax credit. b-From operating loss carryforward. c-Equal to 6 cents a share in 1972 and 2 cents a share in 1971.

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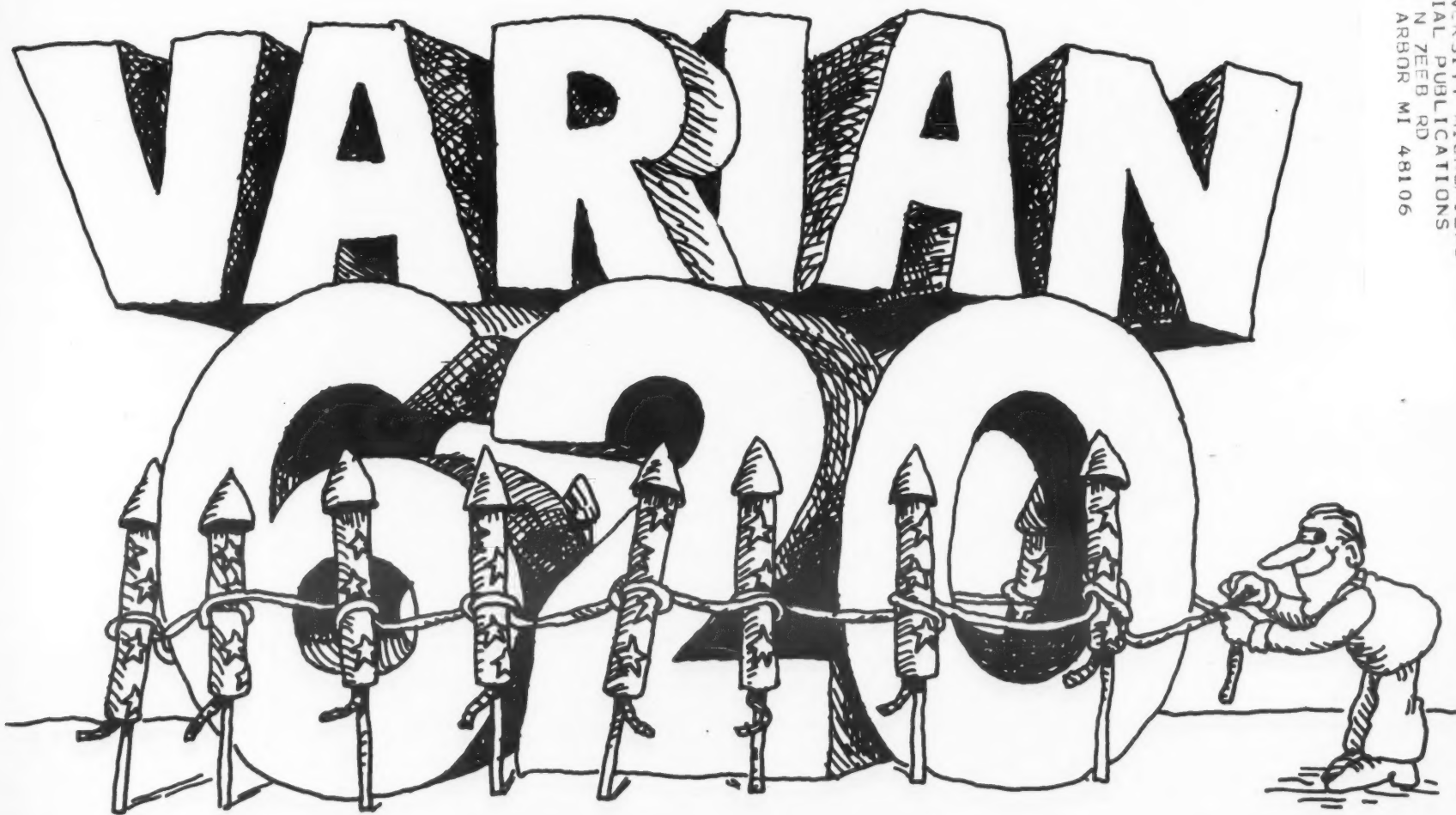
tiply/Divide, Real Time Clock, Power Failure/Restart, and 8 Priority Interrupts. DEC's PDP 11-20 will cost a great deal more. Even the 11-15 costs more.

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